Testing Cloud Services: SaaS, PaaS and IaaS

Kees Blokland
Jeroen Mengerink

Agenda

- Introduction Cloud computing
- Challenges Risks
- Solutions Test measures

Objectives

- Learn how to
  - Cope with Cloud services
  - Detect the (new) risks
  - Mitigate these risks

  By using
    - Your skills
    - Heuristics
    - The Book
    - Discussions and exchange experiences


In the cloud?

What can be done in the cloud?

searching, recording, accounting, paying, writing, reviewing, tracking, calculating, developing, listening, analyzing, transmitting, learning, controlling, purchasing, testing, alarming, changing, updating, deleting, accessing, rejecting, correcting, studying, booking, receiving, tracing, protecting, deciding, managing, teaching, facilitating, identifying, copying, removing, demonstrating, checking, showing, selecting, subscribing, unsubscribing, sharing, mailing, communicating, reading, playing, working, meeting, gambling, shopping, storing, cross checking, retrieving, configuring, sketching, saving, accelerating, enhancing, creating, growing, checking in, checking out, finding out, reaching, denying, talking, designing, making, verifying, measuring

Develop and Test

Email
Surf
Transfer

Operate and Manage

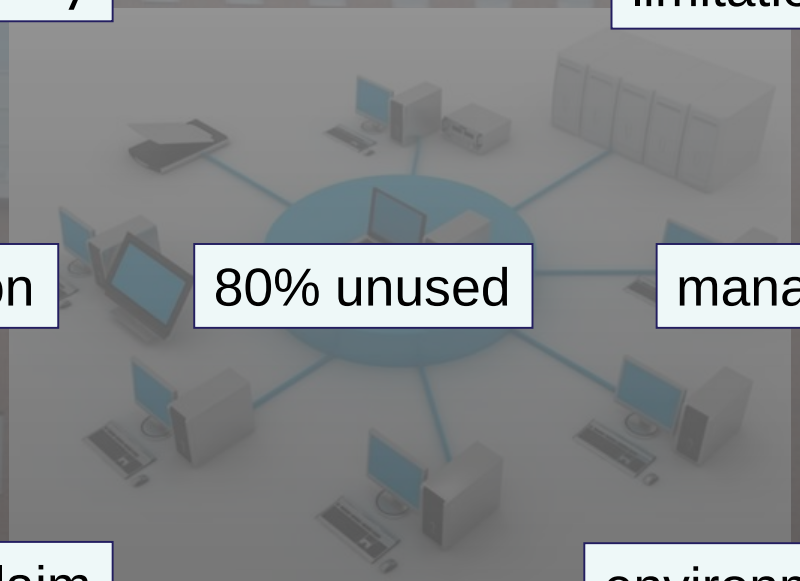
Store

op and Test

Email
Surf
Transfer

redundancy

limitations



costs for innovation

80% unused

management overhead

storage claim

environmentally unfriendly

Operate and Manage

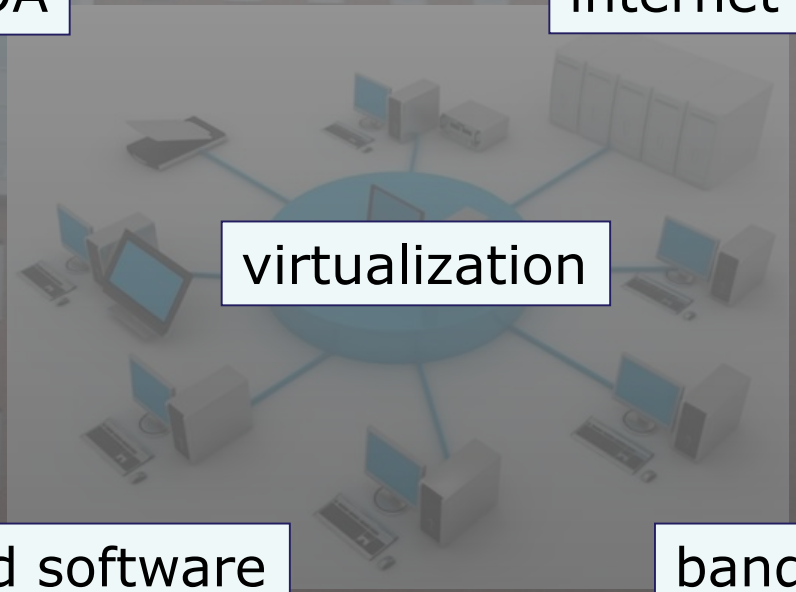
Store

op and Test

Email
Surf
Transfer

SOA

internet technology



virtualization

standard software

bandwidth

Operate and Manage

Store

searching, recording, accounting, paying, writing, reviewing, tracking, calculating, developing, listening, ana ansmitting, learning, c lling, purchasing, testing, alarming, changing ating, deleting, acces cting, studying, booking, recei ting, deciding, managing, teac tifying, copying, removing, de ing, showing, selecting, sub bing, sharing, mailing, commu aying, working, meeting, gam storing, cross checking, retrieving, configuring, sketching, saving, ac ancing, creating, growing ecking in, checking out, finding out, reaching, denying, talking, designing, making, verifying, measuring

Develop and Test

Email
Surf
Transfer

Operate and Manage

Store

Essential characteristics

- ☑ On-demand service
  - ☑ Self service provisioning, pay-per-use
  - ☑ No human interaction

US: National Institute of Standards and Technology
http://www.nist.gov

Essential characteristics

- ☑ On-demand service
- ☑ Broad network access
  - ☑ Standard mechanisms over networks
  - ☑ "Any" client



US: National Institute of Standards and Technology
http://www.nist.gov

Essential characteristics

- ☑ On-demand service
- ☑ Broad network access
- ☑ Resource pooling
  - ☑ Multi-tenant
  - ☑ Storage, processing, memory, virtual machines, …
  - ☑ Location independent

US: National Institute of Standards and Technology
http://www.nist.gov

Essential characteristics

- ☑ On-demand service
- ☑ Broad network access
- ☑ Resource pooling
- ☑ Rapid elasticity
  - ☑ Rapid scale in and out
  - ☑ "Any quantity" at any time

US: National Institute of Standards and Technology
http://www.nist.gov

Essential characteristics

- ☑ On-demand service
- ☑ Broad network access
- ☑ Resource pooling
- ☑ Rapid elasticity
- ☑ Measured service
  - ☑ Controlled resource use
  - ☑ Transparency, pay-per-use

US: National Institute of Standards and Technology
http://www.nist.gov

Service models

- Nocloud
- Infrastructure as a Service
- Platform as a Service
- Software as a Service

Internal | Cloud

Application

Platform

Virtualization

Hardware

Amazon Elastic Compute Cloud (Amazon EC2)

rackspace HOSTING

Run your web apps on Google's infrastructure
Easy to build, easy to maintain, easy to scale

Windows Azure

Deployment models

- Public
- Private
- Community
- Hybrid

Essential characteristics

- ☑ On-demand service
- ☑ Broad network access
- ☑ Resource pooling
- ☑ Rapid elasticity
- ☑ Measured service

Deployment models

- private cloud
- community cloud
- public cloud
- hybrid cloud

Service Models

- Software as a Service
  - Platform as a Service
    - Infrastructure as a Service

US: National Institute of Standards and Technology
http://www.nist.gov

What is “done” in the cloud?

<500 employees

Publ

*aaS

Mail
Storage
Infrastructure
CRM
Finance
Business processes

>500

Private
Hybride
Community

aaS, DaaS, SaaS

*aa

Data Centre
Data Management

Business processes

Consumer

Public

SaaS

urf and m

Dropbox
Google services
Spotify
Picasa
Games
……

Theoretical Basis

What is in the book?

1. What is cloud computing?
2. The changing role of the test manager
3. What to test?
4. How to test?

Page xx

What do you see as the two main risks of involving the cloud?


Multi vendor
Standards
Testability
Cyber crime
Anywhere, anytime
Location
Continuity
B.Y.O.D.
Energy saving
Security
Elasticity
Privacy
Legislation
Performance
Offline vs Online
Vendor lock-in
Integration
Multi platform
Migration
User experience
Costs
Backup & recovery
Hosting
Impact organisation


Risks
Performance
Security
Availability & Continuity
Functionality
Maintainability
Legislation & Regulations
Suppliers & Outsourcing
Standards
Cyber crime
Anywhere, anytime
Location
Continuity
Security
Energy saving
Privacy
Legislation
Offline vs Online
Integration
Migration
User experience
Costs
Hosting
tion

Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

Suppliers & Outsourcing

Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

Suppliers & Outsourcing

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

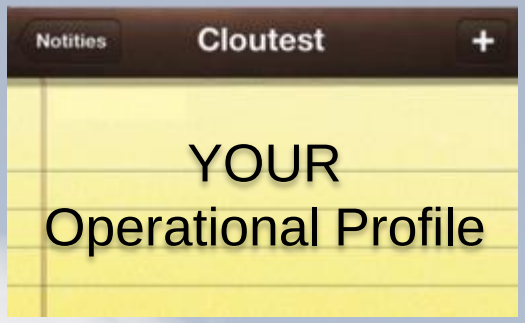
Suppliers & Outsourcing

Table 4–1 *Performance risks*

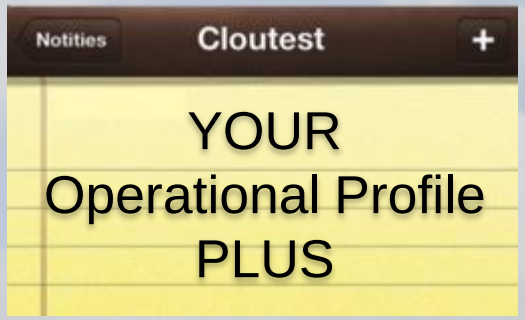
Risk	Test measure (section number/s)
Response times result in problems: – Too high – Increase too much at expected peaks – Increase too much at unexpected peaks	5.2
Processing capacity (throughput) is insufficient.	5.2.1
Upload/download speed (bandwidth) is insufficient: – On supplier side – On customer side	5.1.3, 5.2.1 5.2
Other customers affect performance.	5.1.3, 5.2.1, 5.2.4
Performance is insufficient due to overbooking at supplier side.	5.2.1, 5.9.2
Performance is not sufficient on all types of devices.	5.2, 5.9.2
Customer experiences performance is insufficient.	5.1.3, 5.2.1
Scaling does not suffice: – Scaling up manually does not work. – Scaling down manually does not work. – Manual scaling causes disruptions. – Scaling up automatically does not work. – Scaling down automatically does not work. – Automatic scaling causes disruptions. – Insufficient growth potential.	5.1.3, 5.2.4
Performance varies due to Internet connection.	5.2, 5.9.1, 5.9.2
Performance decreases due to changes by supplier.	5.2, 5.9.1, 5.9.2
Performance deteriorates over time.	5.2.3,5.9.1,5.9.2
User demands change over time.	5.9.3

Risks

- **Performance**
- Security
- Availability & Continuity
- Functionality
- Maintainability
- Legislation & Regulations
- Suppliers & Outsourcing



Other customers



Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

Suppliers & Outsourcing

Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

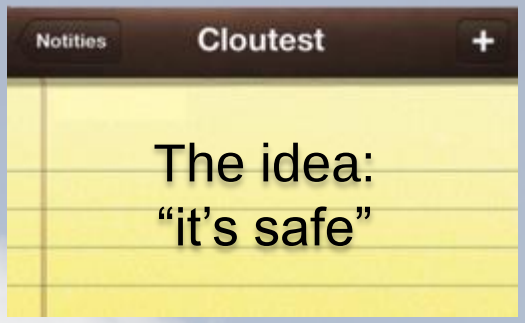
Suppliers & Outsourcing

Table 4–2 *Security risks*

Risk	Test measure (section number/s)
Buildings insufficiently protected against break-in	5.1.3, 5.3.2
Authentication is insufficient: – Other customers (possibly competitors) gain access. – Unauthorized people gain access. – Authorized people cannot gain access. – Customer gains access to other customers' data.	5.1.3, 5.3.5
Authorization is insufficient: – Too few roles and functions can be defined on the customer side. – Too few functions are assigned different access rights. – Administrators on the supplier's side are not sufficiently restricted from accessing client data.	5.1.3, 5.3.6, 5.6.13, 5.9.2
There are too many people that can access everything (on the supplier side).	5.1.3, 5.2.9
Data is accessible through insufficient encryption: – By customer – On network – By supplier	5.1.3, 5.3.4
Service is insufficiently robust against attacks by hackers.	5.3.7, 5.3.10
Data is lost: – Storage device error – Errors in encryption – Loss of encryption key – Scaling (including elasticity) – Procedural errors – Software errors	 5.5 5.3.4 5.3.4 5.2.4 5.4.6, 5.4.7 5.6
No access to data because of a business incident on the supplier side.	5.1.3, 5.5.5
Unauthorized people have access to data because of unsafe user behavior.	5.3.3
(Un)authorized access is not traceable.	5.1.3, 5.3.8
Security is not up to date: – On supplier side – On connected systems (customer) – On user devices (customer)	5.4.7, 5.9
It is unknown if user's own devices are safe.	5.3.3
Data is unintentionally not (fully) deleted.	5.6.13,5.7.6
Disruption of the (virtual) environment by others occurs.	5.9

Risks

- Performance
- **Security**
- Availability & Continuity
- Functionality
- Manageability
- Legislation & Regulations
- Suppliers & Outsourcing



Everything over the web

Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

Suppliers & Outsourcing

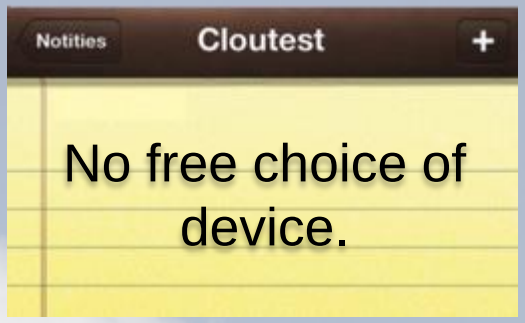
Table 4–2 *Security risks*

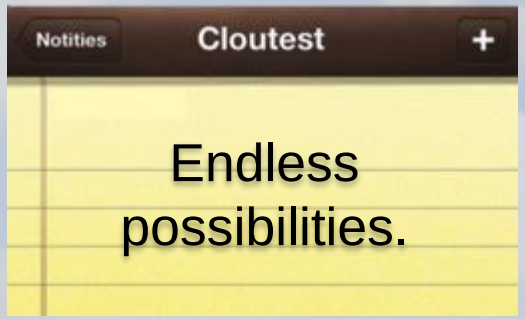
Risk	Test measure (section number/s)
Buildings insufficiently protected against break-in	5.1.3, 5.3.2
Authentication is insufficient: – Other customers (possibly competitors) gain access. – Unauthorized people gain access. – Authorized people cannot gain access. – Customer gains access to other customers' data.	5.1.3, 5.3.5
Authorization is insufficient: – Too few roles and functions can be defined on the customer side. – Too few functions are assigned different access rights. – Administrators on the supplier's side are not sufficiently restricted from accessing client data.	5.1.3, 5.3.6, 5.6.13, 5.9.2
There are too many people that can access everything (on the supplier side).	5.1.3, 5.2.9
Data is accessible through insufficient encryption: – By customer – On network – By supplier	5.1.3, 5.3.4
Service is insufficiently robust against attacks by hackers.	5.3.7, 5.3.10
Data is lost: – Storage device error – Errors in encryption – Loss of encryption key – Scaling (including elasticity) – Procedural errors – Software errors	 5.5 5.3.4 5.3.4 5.2.4 5.4.6, 5.4.7 5.6
No access to data because of a business incident on the supplier side.	5.1.3, 5.5.5
Unauthorized people have access to data because of unsafe user behavior.	5.3.3
(Un)authorized access is not traceable.	5.1.3, 5.3.8
Security is not up to date: – On supplier side – On connected systems (customer) – On user devices (customer)	5.4.7, 5.9
It is unknown if user's own devices are safe.	5.3.3
Data is unintentionally not (fully) deleted.	5.6.13,5.7.6
Disruption of the (virtual) environment by others occurs.	5.9

Risks

- Performance
- **Security**
- Availability & Continuity
- Functionality
- Maintainability
- Legislation & Regulations
- Suppliers & Outsourcing

Bring Your Own Device





Risks

- Performance
- Security
- **Availability & Continuity**
- Functionality
- Maintainability
- Legislation & Regulations
- Suppliers & Outsourcing

Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

Suppliers & Outsourcing

Table 4–3 *Availability and continuity risks*

Risk	Test measure (section number/s)
Connection to the Internet is disrupted: – At the supplier – At the interfacing systems (customer) – At the user devices (customer)	5.5.7
The Internet connection is disrupted at other locations around the world.	5.5.7
The service is partially (not) available.	5.5, 5.9
The offline functionality does not work properly (no synchronization).	5.5.9, 5.6.11
The business process is disrupted by problems with migration: – Missing data after migration – Data changed during migration – Transactions lost during migration	5.7, 5.6.1, 5.9
Data has become unreadable: – Because of hardware failure – Because of loss of encryption key	5.5.6 5.3.4
Data is lost "somewhere."	5.5.3, 5.9.2
Bankruptcy of the service supplier threatens the continuity of business processes.	5.1.3, 5.9
There is no backup plan.	5.5.8
Responsibility for continuity failure is not clear because multiple suppliers are involved.	5.1.3
There are insufficient agreements in place about availability.	5.1.3

Risks

- Performance
- Security
- **Availability & Continuity**
- Functionality
- Maintainability
- Legislation & Regulations
- Suppliers & Outsourcing

Internet connection lost

- @ supplier
- @ user
- @ other systems

‘Off line” does not work

Information is lost

Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

Suppliers & Outsourcing

IBM Cloud Storage Partner Nirvanix Files for Bankruptcy

By Klint Finley
10.02.13
1:58 PM

Photo: Ricardo Liberato/Flickr

The company behind IBM's storage cloud is indeed on the way out.

Last month, Nirvanix — the San Diego, California company that powered IBM's SmartCloud Storage service — told customers and partners that it was shutting down on September 30, giving them just two weeks to migrate data, and now, it has filed for bankruptcy.

Nirvanix finally broke its silence this week with a post to its website revealing the Chapter 11 bankruptcy filing and giving customers and partners an additional two weeks to remove data from its service. The deadline for data removal is now October 15.

"Nirvanix voluntarily sought Chapter 11 bankruptcy protection in order to pursue all alternatives to maximize value for its creditors while continuing its efforts to provide the best possible transition for customers," the site says.

The initial news of the shutdown came as a surprise. Nirvanix — founded in 2007 as StreamLoad — had partnerships with IBM and Dell, was lauded for its technical chops, and was well funded. It raised over $70 million dollars, including a $25 million round of funding led by Khosla Ventures last year. But it did have leadership issues. The company has had five CEOs since 2008, and three in the past year, according to CRN. The broader reality is that running a cloud storage business is expensive.

This week's announcements, first reported by the Wall Street Journal, provide some closure for those waiting to see what would become of the company — and of SmartCloud Storage.

"We have an agreement with IBM, and a team from IBM is ready to help you," the site says. "In addition, we have established a higher speed connection with some companies to increase the rate of data transfer from Nirvanix to their servers."

The Nirvanix site specifically mentions IBM SoftLayer, Amazon S3, Google Storage, and Microsoft Azure as possible replacements.

Khosla Ventures is the largest equity holder, with 15.5 percent of common stock, 73.2 percent of series 1 preferred stock, and 72.9 percent of junior preferred stock. CEO Debra Chrapaty, formerly the CIO of Zynga, is still listed as CEO on the bankruptcy forms.

According to the bankruptcy paperwork, Nirvanix's largest creditor is Dell Marketing L.P., a subsidiary of Dell formerly known as storage outfit EqualLogic, which it acquired in 2008. Others include IT infrastructure monitoring software company Nimsoft (now owned by CA), Salesforce.com, and IT industry analysis firm Gartner.

http://www.wired.com/wiredenterprise/2013/10/nirvanix-bankrupt/ 3-10-2013

Risks

- Performance
- Security
- Availability & Continuity
- **Functionality**
- Maintainability
- Legislation & Regulations
- Suppliers & Outsourcing

Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & Regulations

Suppliers & Outsourcing

Table 4–4 *Functionality risks*

Risk	Test measure (section number/s)
Service and business processes do not align: – Service does not meet all requirements of the business processes. – Using the service results in the need for business process changes. – Service does not work well in E2E business processes. – Service provides insufficient means for configuration.	5.1.3, 5.6.1
Users are not comfortable with the way the service works.	5.1.3, 5.6.3
Quality of the service is inadequate (bugs).	5.6
The manuals are inadequate.	5.4.1, 5.4.2, 5.4.3, 5.6.1, 5.6.3
Service is not according to the supplier's description.	5.4.1, 5.6
Repairing user errors is not possible.	5.1.3, 5.5.4
Functional maintainability of the service is insufficient.	5.4, 5.6
Devices, operating systems, and browsers are not adequately supported.	5.1.3, 5.6.9
Configuration is not done correctly.	5.6.5
Customization: – Is needed but not possible – Does not function properly on supplier side – Does not function properly on customer side – Is not robust when changes are implemented	 5.1.3 5.6.6 5.6.7 5.4.8, 5.9.1
Data is not recorded due to insufficient disk quota.	5.2.3
Service implementation: – Has an impact on ongoing business – Causes problems with migrating data to the service	5.7
Service does not match the technical infrastructure of the customer: – The service cannot be properly integrated with other services. – The service cannot be properly integrated with the customer's in-house applications. – Customization is needed for integration.	5.1.3, 5.6.4, 5.6.5, 5.6.6, 5.6.7

Risks

- Performance
- Security
- Availability & Continuity
- **Functionality**
- Maintainability
- Legislation & Regulations
- Suppliers & Outsourcing

Mismatch

service <> business process

Functionality is changed

Insufficient usability

Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- **Maintainability**
- Legislation & Regulations
- Suppliers & Outsourcing

Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- **Maintainability**
- Legislation & Regulations
- Suppliers & Outsourcing

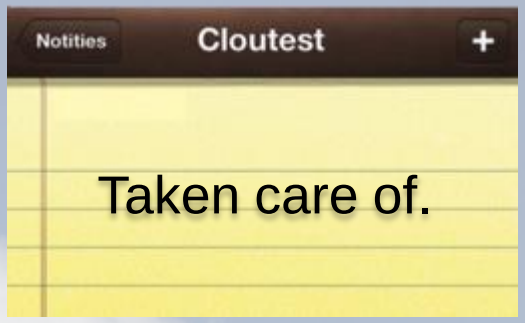
Table 4–5 *Maintainability risks*

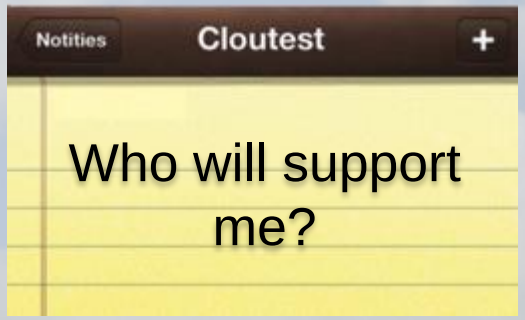
Risk	Test measure (section number/s)
Environments are not available for the following purposes: – Testing the service – Testing performance – Testing the E2E business processes	5.2.12, 5.4.4, 5.9
Documentation from supplier is no longer correct after the service is modified.	5.4.1, 5.6.12
Customer documentation is no longer correct after the service is modified.	5.4.2, 5.4.3, 5.6.12
Supplier documentation is insufficient.	5.4.1, 5.6
Business process descriptions are not up to date.	5.4.2
Test documentation from supplier is insufficient.	5.1.3, 5.4.5
It's difficult to incorporate the service in an (automated) test setup.	5.1.3, 5.4.8
There are problems with repairing error situations.	5.1.3, 5.4.6, 5.4.7
IT landscape is not fully under in-house control.	5.1.3, 5.4.4, 5.9
There is insufficient experience with cloud computing.	All sections
Problems with the supplier's issue procedure: – It's not clear. – It's not available. – It does not work properly.	5.1.3, 5.4.6
There is insufficient support from the supplier's help desk.	5.1.3, 5.4.6
There is no change procedure.	5.1.3, 5.4.7, 5.9.1

Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- **Maintainability**
- Legislation & Regulations
- Suppliers & Outsourcing

Backup and recovery





Risks

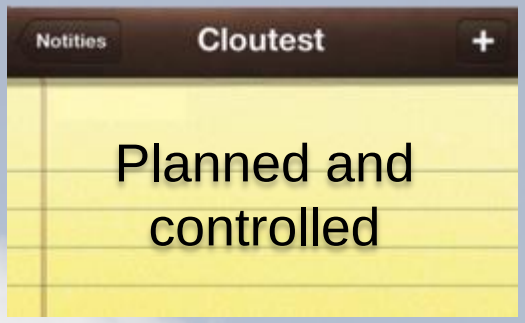
- Performance
- Security
- Availability & Continuity
- Functionality
- **Maintainability**
- Legislation & Regulations
- Suppliers & Outsourcing

Table 4–5 *Maintainability risks*

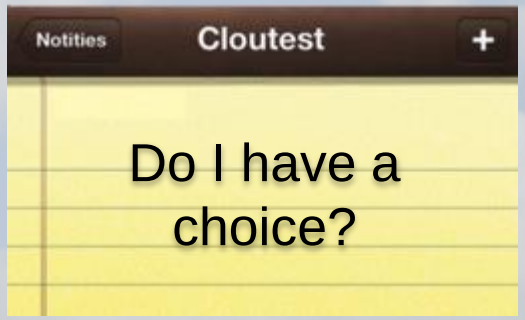
Risk	Test measure (section number/s)
Environments are not available for the following purposes: – Testing the service – Testing performance – Testing the E2E business processes	5.2.12, 5.4.4, 5.9
Documentation from supplier is no longer correct after the service is modified.	5.4.1, 5.6.12
Customer documentation is no longer correct after the service is modified.	5.4.2, 5.4.3, 5.6.12
Supplier documentation is insufficient.	5.4.1, 5.6
Business process descriptions are not up to date.	5.4.2
Test documentation from supplier is insufficient.	5.1.3, 5.4.5
It's difficult to incorporate the service in an (automated) test setup.	5.1.3, 5.4.8
There are problems with repairing error situations.	5.1.3, 5.4.6, 5.4.7
IT landscape is not fully under in-house control.	5.1.3, 5.4.4, 5.9
There is insufficient experience with cloud computing.	All sections
Problems with the supplier's issue procedure: – It's not clear. – It's not available. – It does not work properly.	5.1.3, 5.4.6
There is insufficient support from the supplier's help desk.	5.1.3, 5.4.6
There is no change procedure.	5.1.3, 5.4.7, 5.9.1

Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- **Manageability**
- Legislation & Regulations
- Suppliers & Outsourcing



Updates, patches, fixes, …



Risks

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & regulations

Suppliers & Outsourcing

Risks

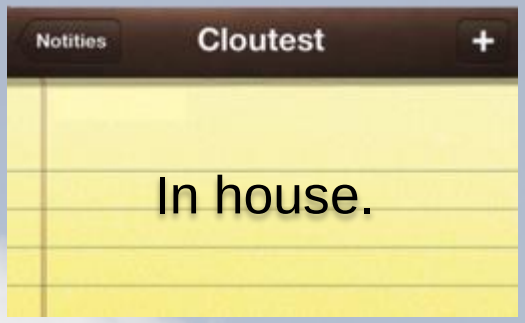
- Performance
- Security
- Availability & Continuity
- Functionality
- Maintainability
- **Legislation & regulations**
- Suppliers & Outsourcing

Table 4–6 Legislation and regulations risks

Risk	Test measure (section number/s)
Processing and storing data do not comply with some laws: – Laws in home country – Laws in other countries in which the data can reside	5.1.3, 5.8
Countries have conflicting laws.	5.1.3, 5.8
Legislation is unclear.	5.1.3, 5.8
It is not clear where data is stored, which causes uncertainty about legal risks.	5.1.3, 5.8, 5.9
Legal issues arise when the service is down.	5.1.3, 5.8
There is no agreement with the service provider about safe handling of data.	5.1.3, 5.8
Legislation changes.	5.8, 5.9.3
Reliability of a regime in a country is questionable.	5.1.3
Third parties gain access to company data by citation or investigation (jurisdiction).	5.1.3, 5.8

Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- Maintainability
- **Legislation & regulations**
- Suppliers & Outsourcing



Where is my data?

And is that OK?

Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- Maintainability
- Legislation & regulations
- **Suppliers & outsourcing**

Performance

Security

Availability & Continuity

Functionality

Maintainability

Legislation & regulations

Suppliers & outsourcing

Table 4–7 *Supplier and outsourcing risks*

Risk	Test measure (section number/s)
Bankruptcy of supplier threatens continuity of business process.	[5.1.3, 5.5.5]
Supplier shuts down the service (for example, in the case of conflict).	[5.1.3, 5.5.5]
There is ambiguity in the contract about the following: – Continuity – Performance – Security – Defects – End of contract	 [5.1.3] [5.1.3] [5.1.3] [5.1.3, 5.4.6] [5.1.3, 5.7]
Customer is dependent on one supplier (vendor lock-in).	[5.1.3]
There are multiple suppliers (multivendor) who shirk responsibilities toward each other.	[5.1.3]
Supplier does not support the correct functioning of the service with test results.	[5.4.5]
There is no test set available to determine the correct functioning of the service.	[5.1.3, 5.4.5]
Service ownership is handed over to another party.	[5.9.1]

Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- Maintainability
- Legislation & regulations
- **Suppliers & outsourcing**

Vendor lock in

No agreements

Supplier of the supplier of the supplier …

Supplier is taken over

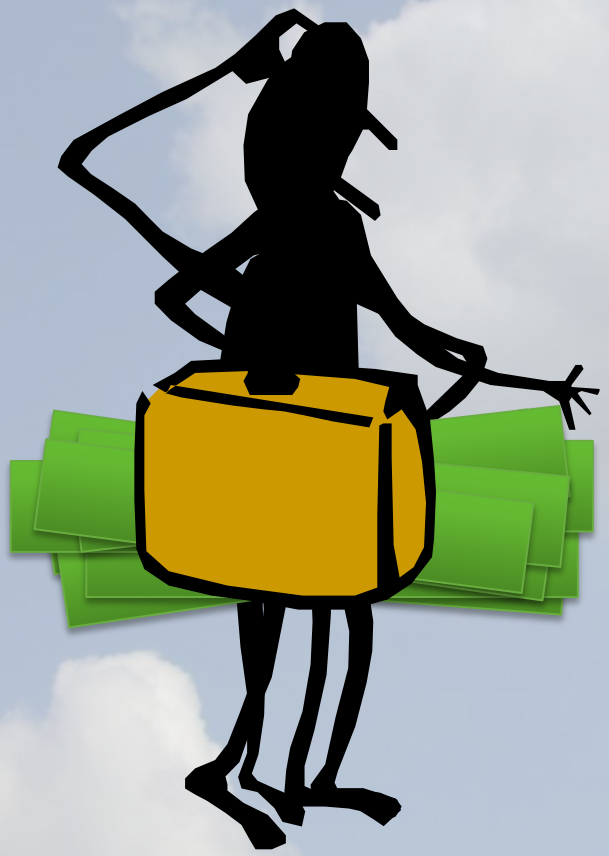
Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- Maintainability
- Legislation & Regulations
- Suppliers & Outsourcing

Testing?

- Simulation
- Audit
- Intake
- Interview
- Assessment
- Check
- Monitor
- Shadow run
- Inspections
- Proof of concept
- Test
- Validate
- Review
- ……

Testing!



- Simulation
- Audit
- Intake
- Interview
- Assessment
- Check
- Monitor
- Shadow run
- Inspections
- Proof of concept
- Test
- Validate
- Review
- ……

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production

Selection

Implementation

Production

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

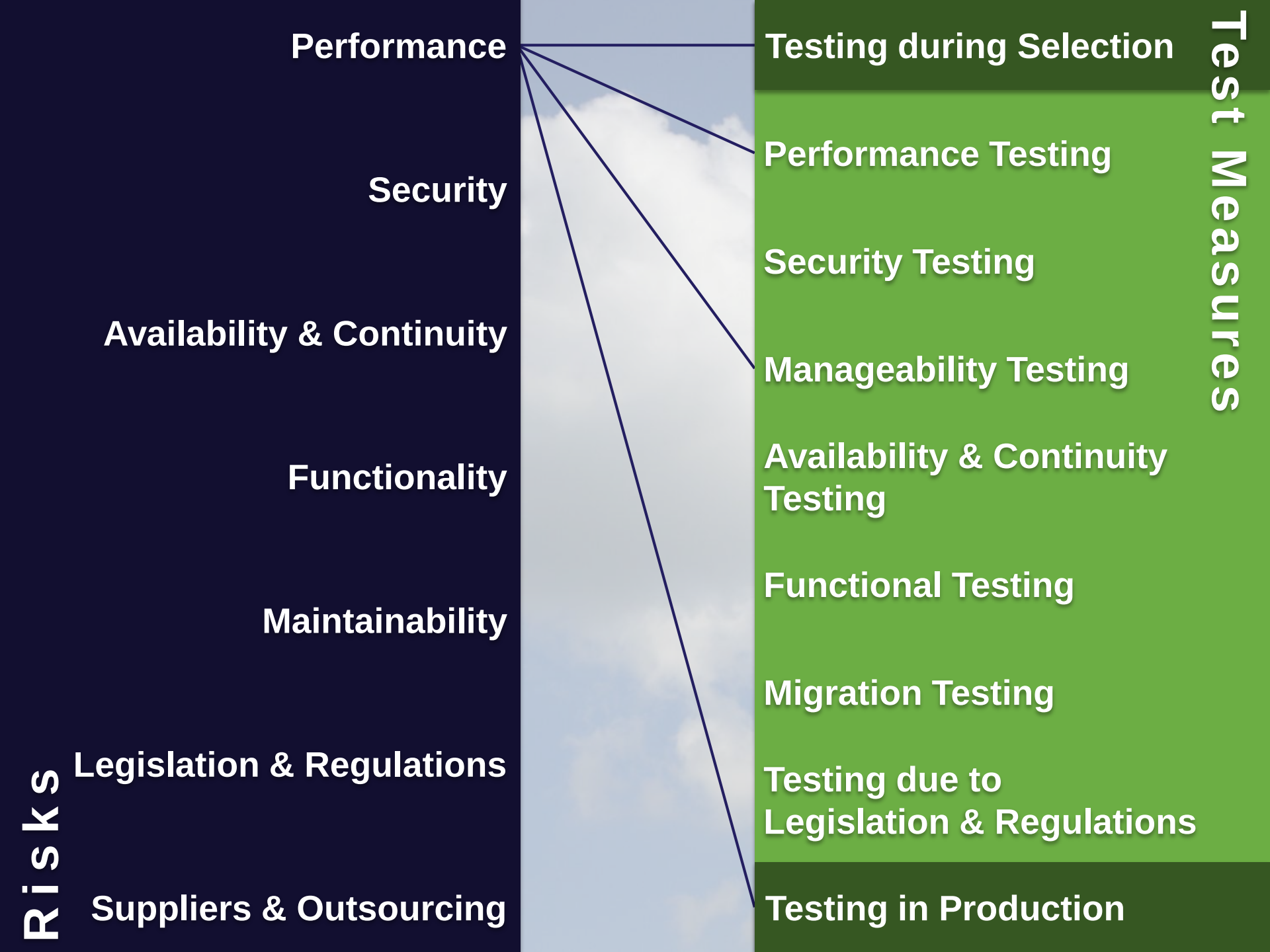
Testing in Production

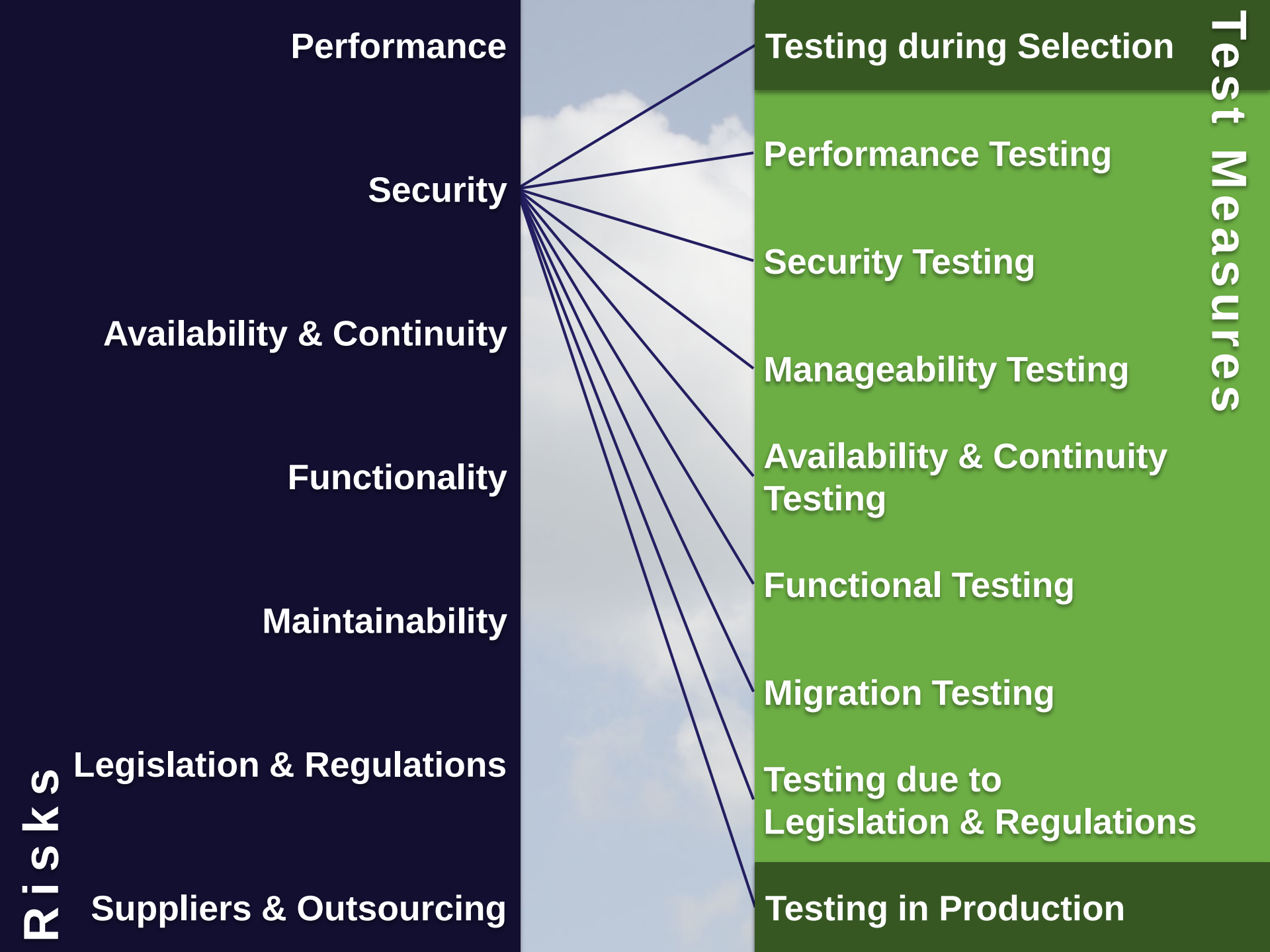
Risks

- Performance
- Security
- Availability & Continuity
- Functionality
- Maintainability
- Legislation & Regulations
- Suppliers & Outsourcing

Test Measures

- Testing during Selection
- Performance Testing
- Security Testing
- Manageability Testing
- Availability & Continuity Testing
- Functional Testing
- Migration Testing
- Testing due to Legislation & Regulations
- Testing in Production


Risks
Performance
Security
Availability & Continuity
Functionality
Maintainability
Legislation & Regulations
Suppliers & Outsourcing
Test Measures
Testing during Selection
Performance Testing
Security Testing
Manageability Testing
Availability & Continuity Testing
Functional Testing
Migration Testing
Testing due to Legislation & Regulations
Testing in Production


Risks
Performance
Security
Availability & Continuity
Functionality
Maintainability
Legislation & Regulations
Suppliers & Outsourcing
Test Measures
Testing during Selection
Performance Testing
Security Testing
Manageability Testing
Availability & Continuity Testing
Functional Testing
Migration Testing
Testing due to Legislation & Regulations
Testing in Production

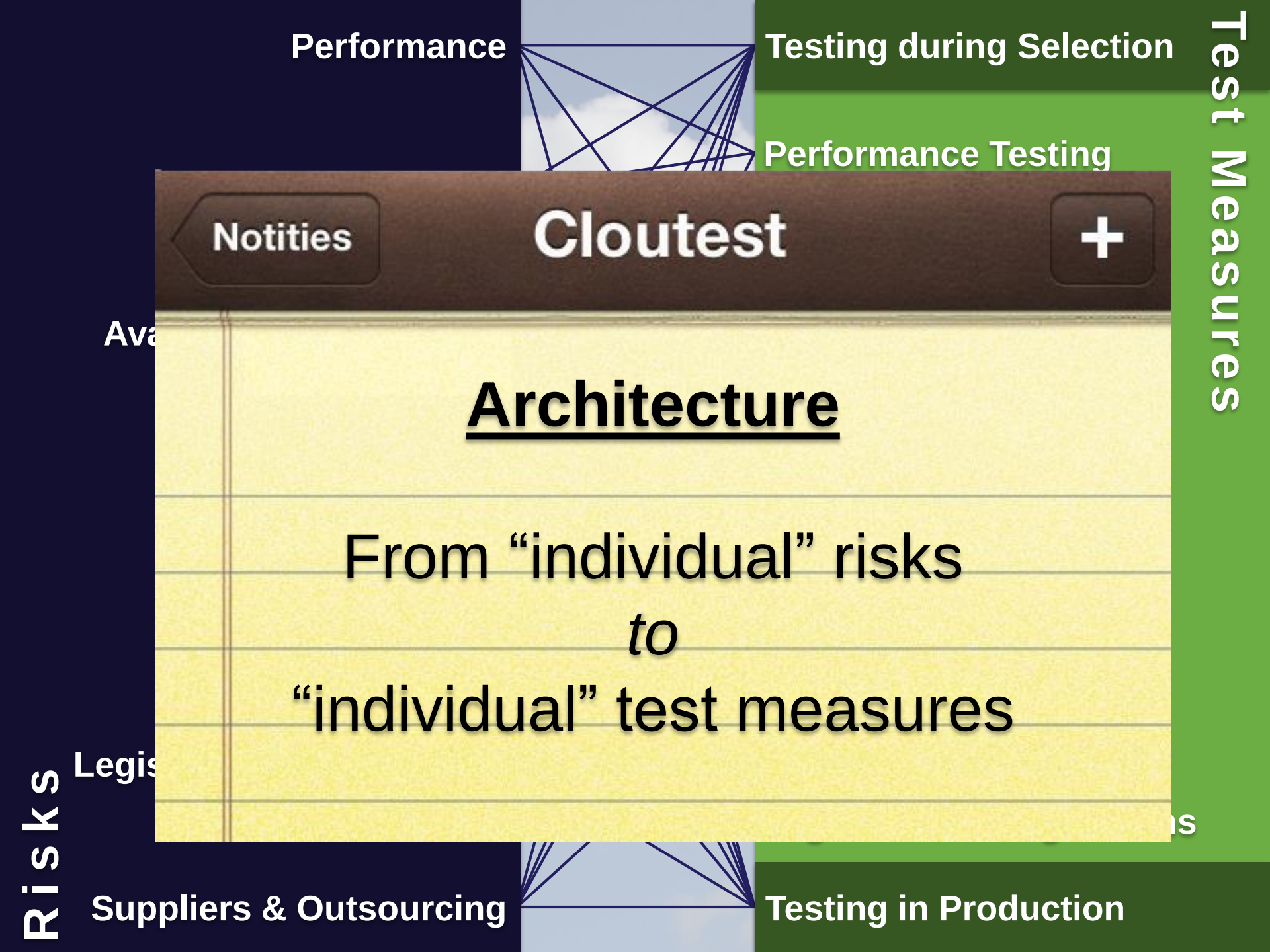
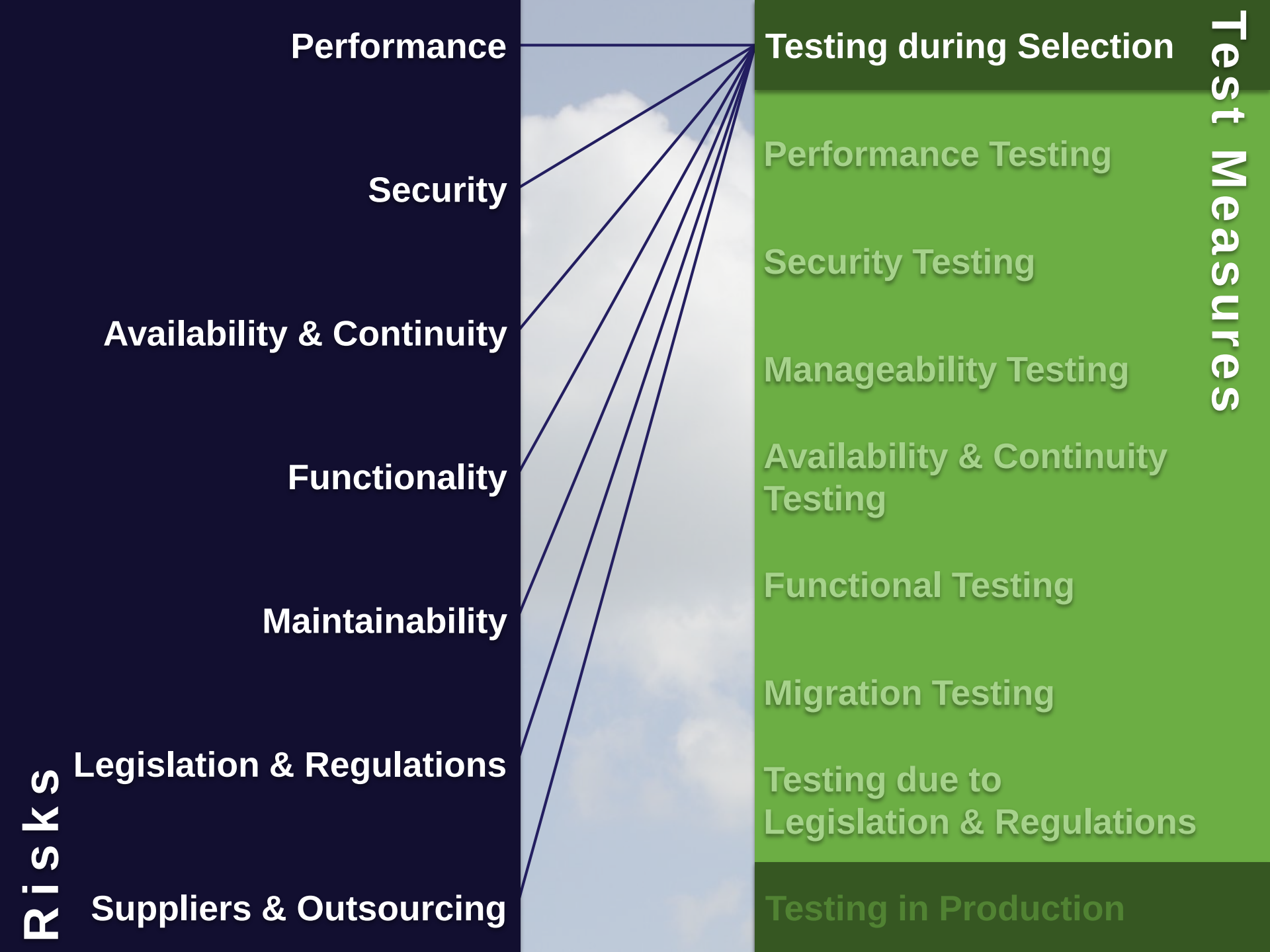

Performance
Testing during Selection
Test Measures
Performance Testing
Notities
Cloutest
+
Ava
Architecture
From “individual” risks
to
“individual” test measures
Legis
ns
Risks
Suppliers & Outsourcing
Testing in Production

Table 4–6 *Legislation and regulations risks*

Risk	Test measure (section number/s)
Processing and storing data do not comply with some laws: – Laws in home country – Laws in other countries in which the data can reside	5.1.3, 5.8
Countries have conflicting laws.	5.1.3, 5.8
Legislation is unclear.	5.1.3, 5.8
It is not clear where data is stored, which causes uncertainty about legal risks.	5.1.3, 5.8, 5.9
Legal issues arise when the service is down.	5.1.3, 5.8
There is no ag ice provider about safe handling of data.	5.1.3, 5.8
Legislation c	5.8, 5.9.3
Reliability c	5.1.3
Third parti gation (jurisdicti	5.1.3, 5.8

Relating Risks to Test Measures


Risks
Performance
Security
Availability & Continuity
Functionality
Maintainability
Legislation & Regulations
Suppliers & Outsourcing
Test Measures
Testing during Selection
Performance Testing
Security Testing
Manageability Testing
Availability & Continuity Testing
Functional Testing
Migration Testing
Testing due to Legislation & Regulations
Testing in Production

Selection Criteria

Completeness
Controllable
For service
For supplier

Spec's and terms
References
……

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production

How do you select the service?

Example selection criteria

CRITERION	Value/ Range	Weighting factor	Yes/No and Comments
Implementation			
Is the impact on current activities acceptable?			
Is a feasible route for migration to the service available?			
Support			
Are changes in the service announced beforehand?			
Are sufficient test facilities available around the service (test environment, test tools, testware, access to infrastructure, etc.)?			
Are there sufficient support facilities?			
Is it clear how incidents can be reported?			
Are incidents resolved fast enough?			
Performance			
Are response times quick enough?			
Is the number of possible simultaneous users high enough?			
Is bandwidth sufficient?			
Is sufficient potential for growth available?			
Is the actual use charged correctly?			
Security			
Are adequate authorization and authentication in place?			

Proof of Concept

- Dynamic testing
- More suppliers
- Time boxing
- Representative

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

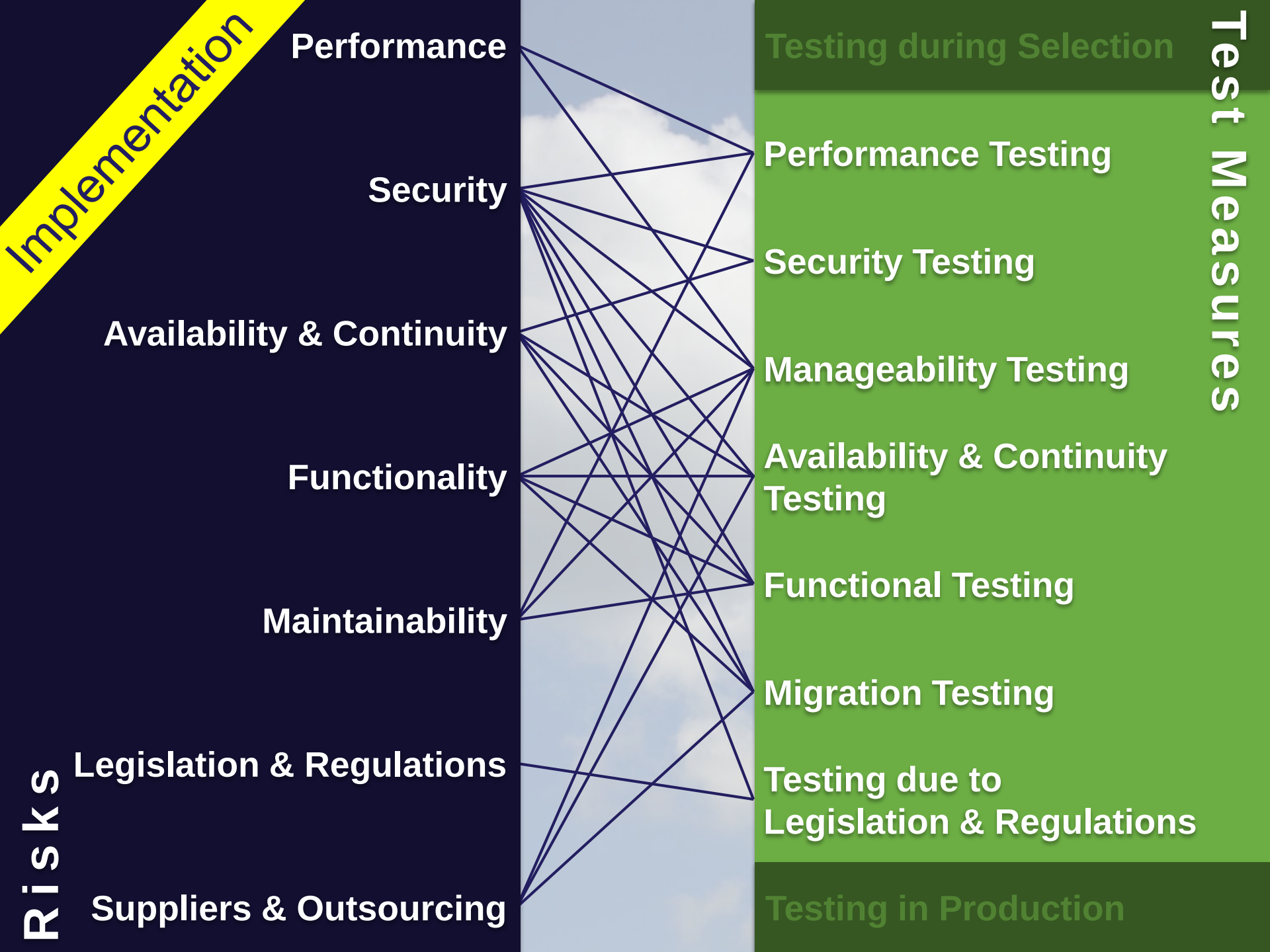
Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production


Implementation
Performance
Security
Availability & Continuity
Functionality
Maintainability
Legislation & Regulations
Suppliers & Outsourcing
Risks
Testing during Selection
Performance Testing
Security Testing
Manageability Testing
Availability & Continuity Testing
Functional Testing
Migration Testing
Testing due to Legislation & Regulations
Testing in Production
Test Measures

Known measures tuned and tweaked

New measures developed

Use:

- Your skills
- Heuristics
- The Book
- Your peers

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

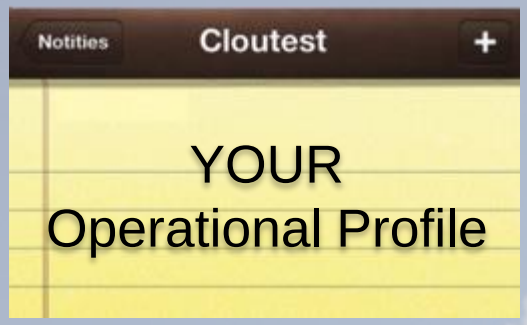
Migration Testing

Testing due to Legislation & Regulations

Testing in Production

Suppose your payroll system moves into the Cloud.

What would you do?



Load Testing

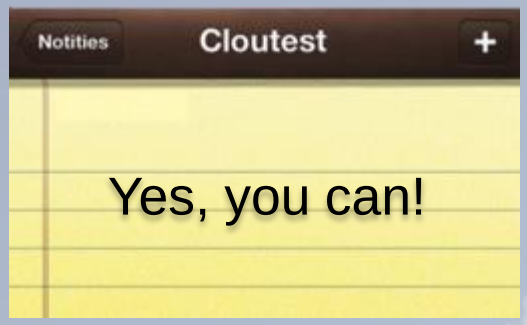
Test Measures

- Testing during Selection
- **Performance Testing**
- Security Testing
- Manageability Testing
- Availability & Continuity Testing
- Functional Testing
- Migration Testing
- Testing due to Legislation & Regulations
- Testing in Production

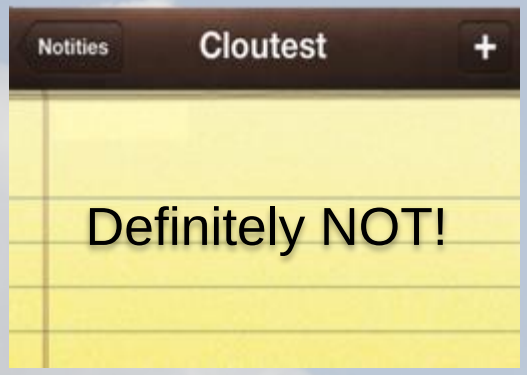
Operational profile

Example. Time sheets

Initiators	**Operations**	**Frequency (number/week)**	**Likelihood**
Administrator time sheets application	*Arrange screen flow* *Mark obligatory fields*	*0.1* *0.1*	*0.0005* *0.0005*
Project administrator	*Add project* *Close project* *Add project employee* *Connect project employee to project* *Add time sheet codes*	*0.4* *0.4* *3* *8* *20*	*0.002* *0.002* *0.015* *0.04* *0.1*
Project employee	*Fill in time sheet each week* *Release time sheet each week*	*80* *80*	*0.4* *0.4*
Manager	*Approve time sheets*	*8*	*0.04*
	Total	*200*	*1*

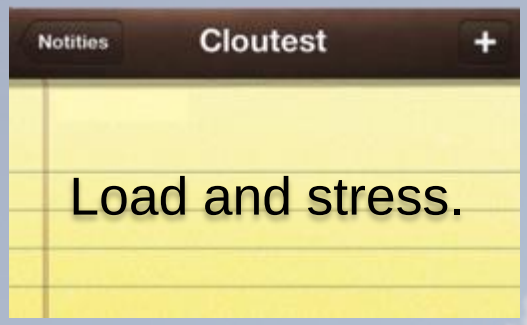


Stress Testing

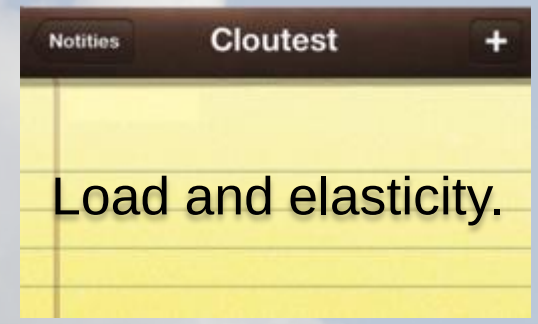


Test Measures

- Testing during Selection
- **Performance Testing**
- Security Testing
- Manageability Testing
- Availability & Continuity Testing
- Functional Testing
- Migration Testing
- Testing due to Legislation & Regulations
- Testing in Production



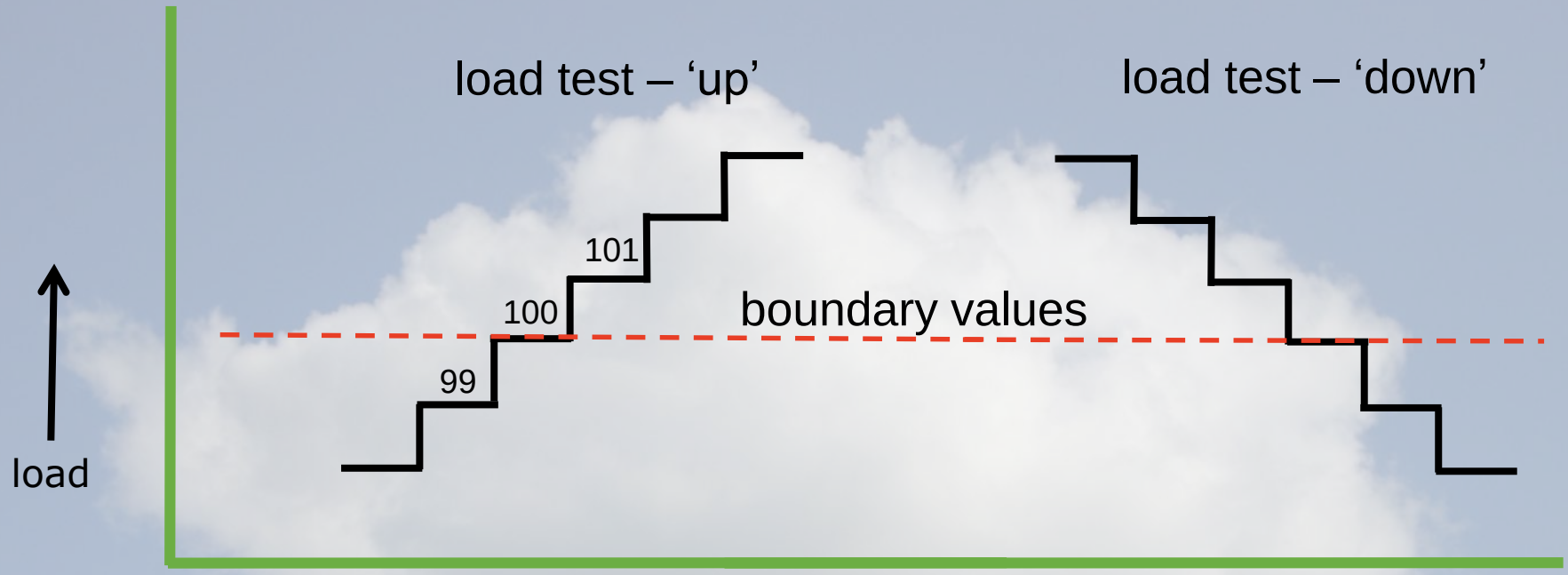
Elasticity



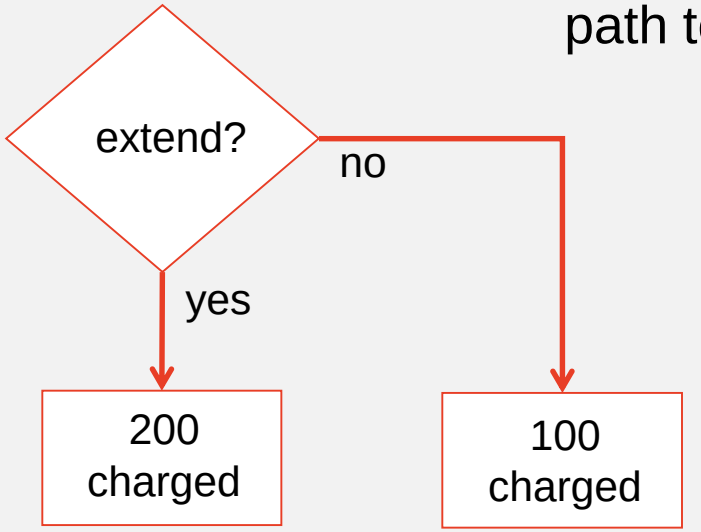
Test Measures

- Testing during Selection
- **Performance Testing**
- Security Testing
- Manageability Testing
- Availability & Continuity Testing
- Functional Testing
- Migration Testing
- Testing due to Legislation & Regulations
- Testing in Production

How would you test elasticity?



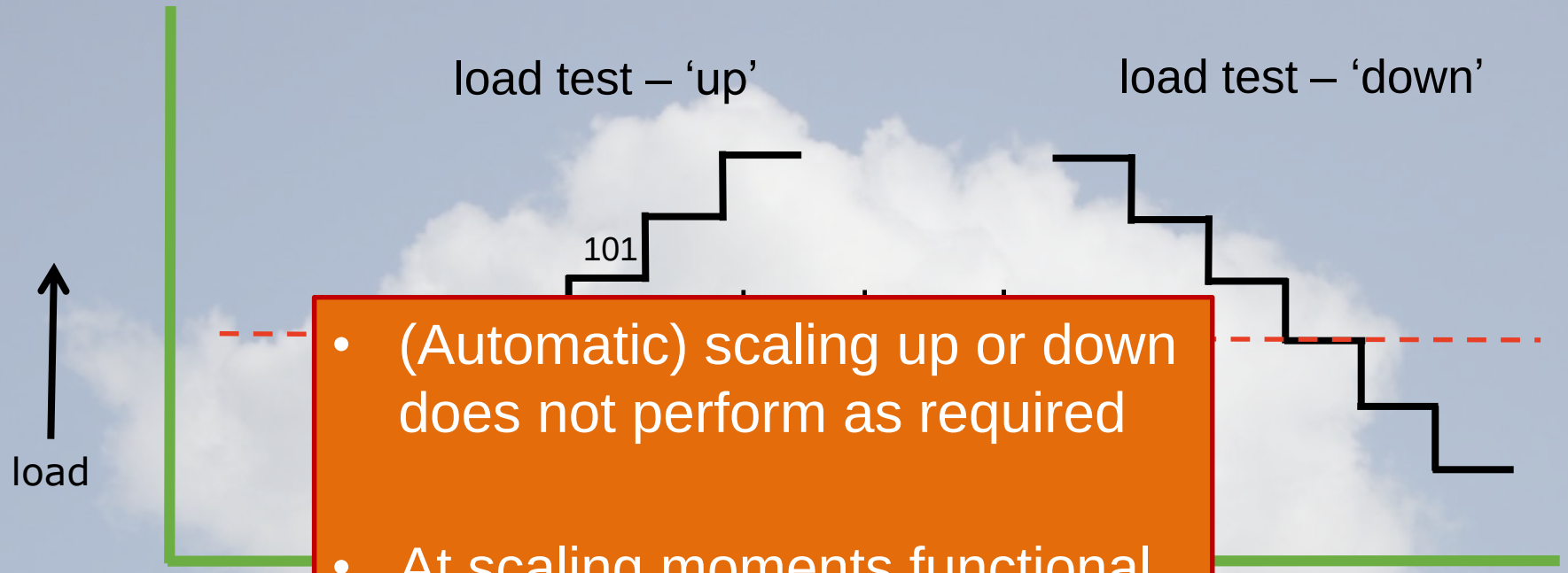
path test



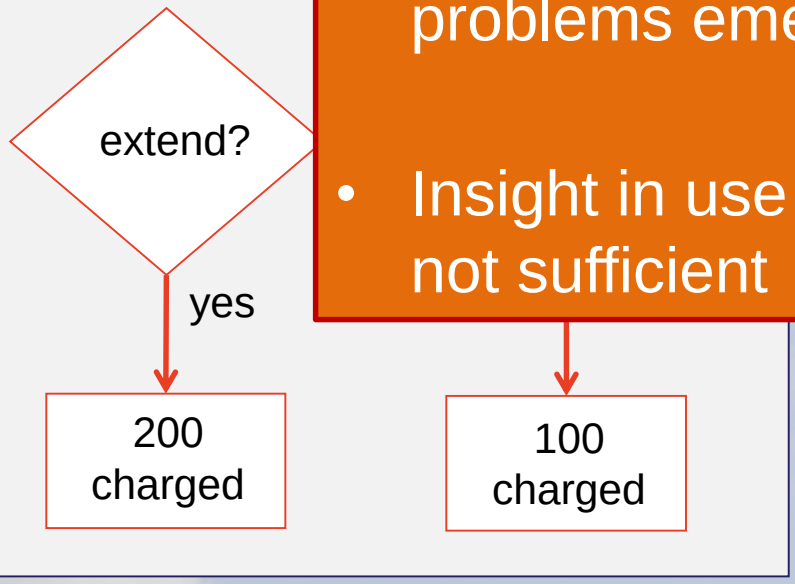
boundary values

‘up’
tc 1: use=99, pay 100
tc 2: use=100, pay 100
tc 3: use=101, pay 200

‘down’
tc1: use=101, pay 200
tc2: use=100, pay 100
tc3: use=99, pay 100



- (Automatic) scaling up or down does not perform as required
- At scaling moments functional problems emerge
- Insight in use based costs is not sufficient



‘down’
tc1: use=101, pay 200
tc2: use=100, pay 100
tc3: use=99, pay 100

- Security at:
  - Network
  - Supplier
  - User

- Encryption
- Authentication and authorisation

IDaaS

- Test logs and audit trails
- Security Audits

Experts

Security patch routines

Test Measures

uring Selection

nce Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production

- Completeness and correctness of specifications and manuals
  - Supplier
  - User

Interface specifications

Supported platforms

Business process specs

User manuals

- Availability of test environments

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

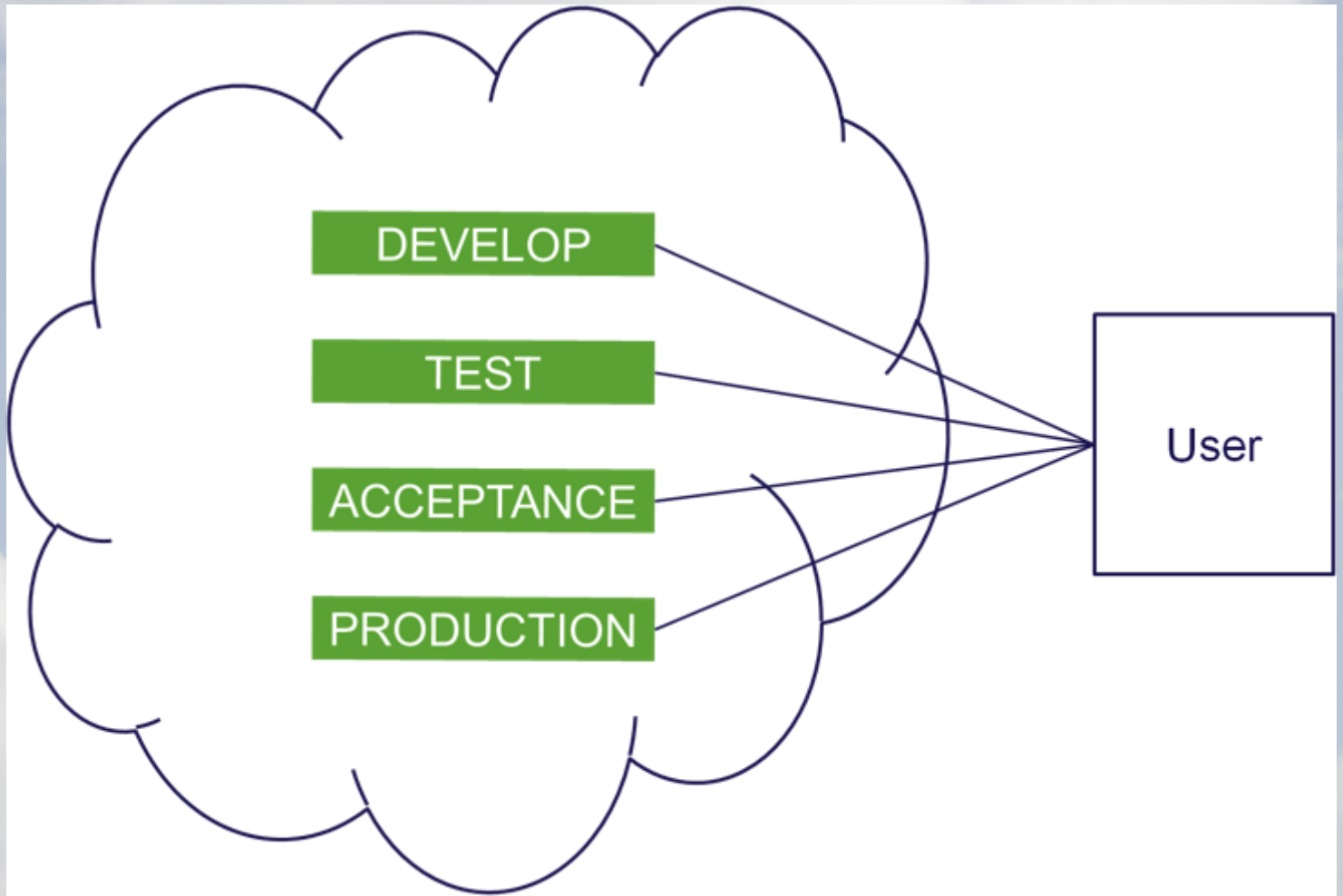
Testing in Production

Test Measures

How do you setup your environment including the external service?

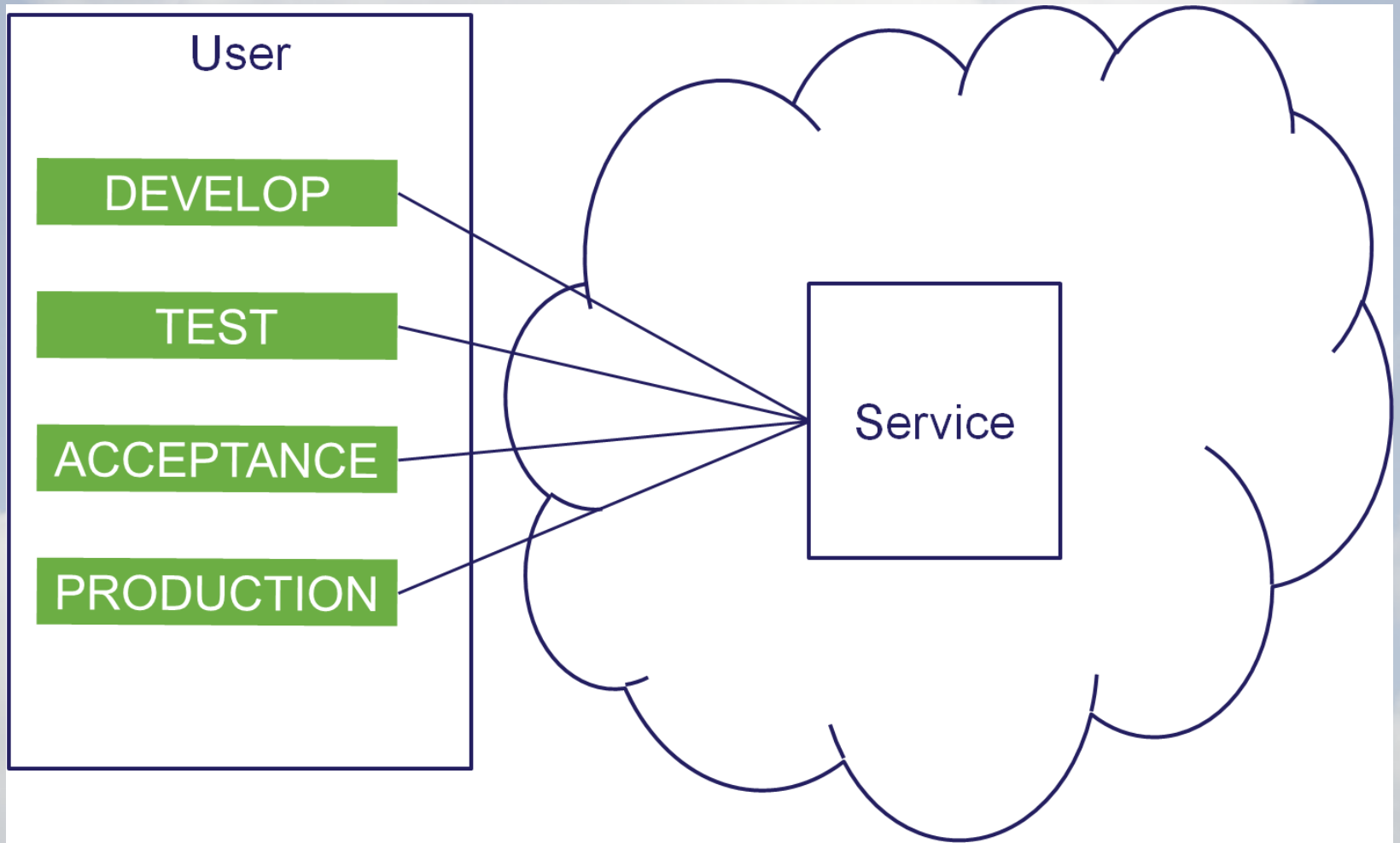
Manageablity of test environments

- Everything in the cloud



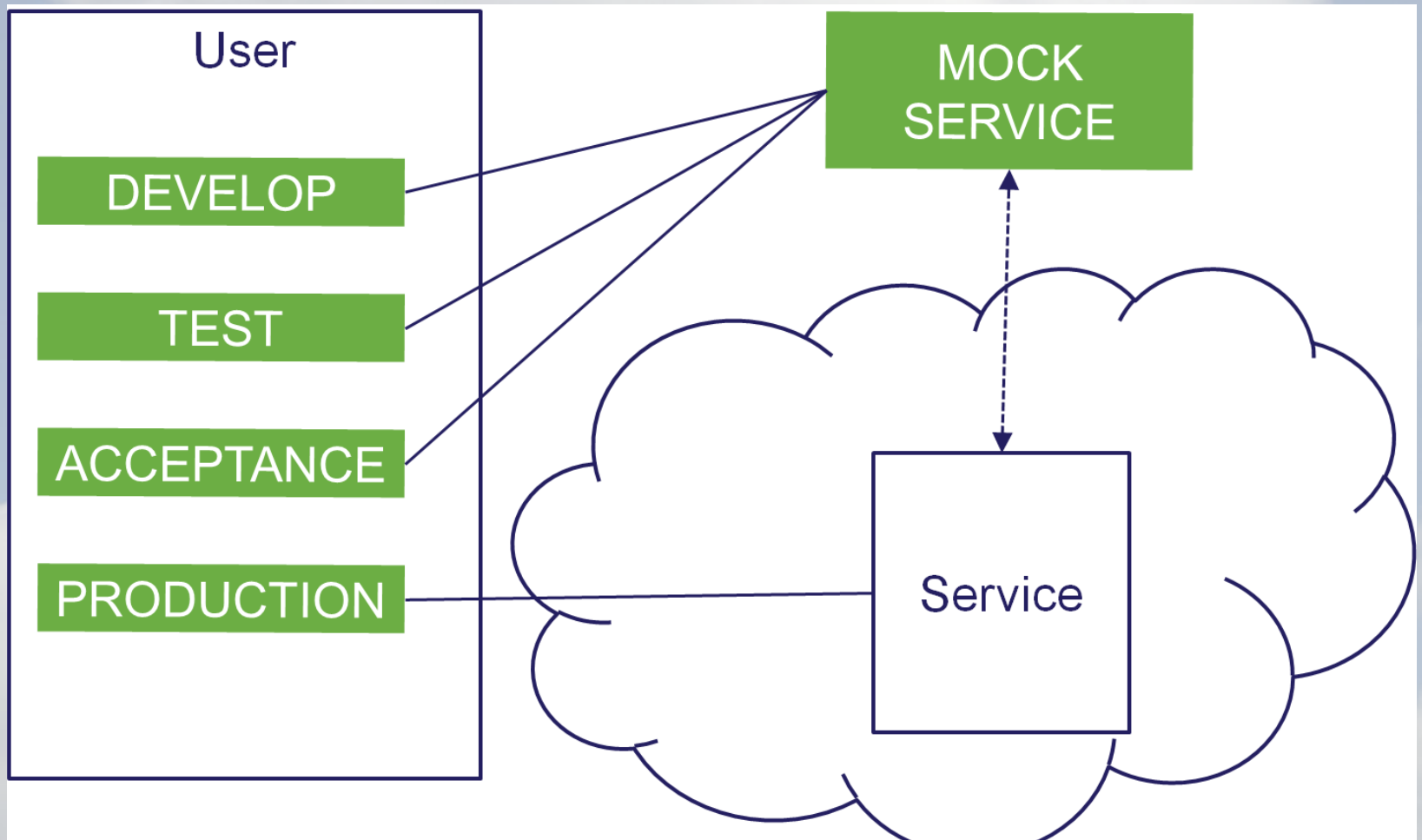
Manageablity of test environments

- Link all current environments to the service



Manageablity of test environments

- Link Production to the real service
- Link other environments to a MOCK SERVICE
  (or another instance of the service)



- Completeness and correctness of specifications and manuals
  - Supplier
  - User
- Availability of test environments
- Management of:
  - Defects
  - Changes

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

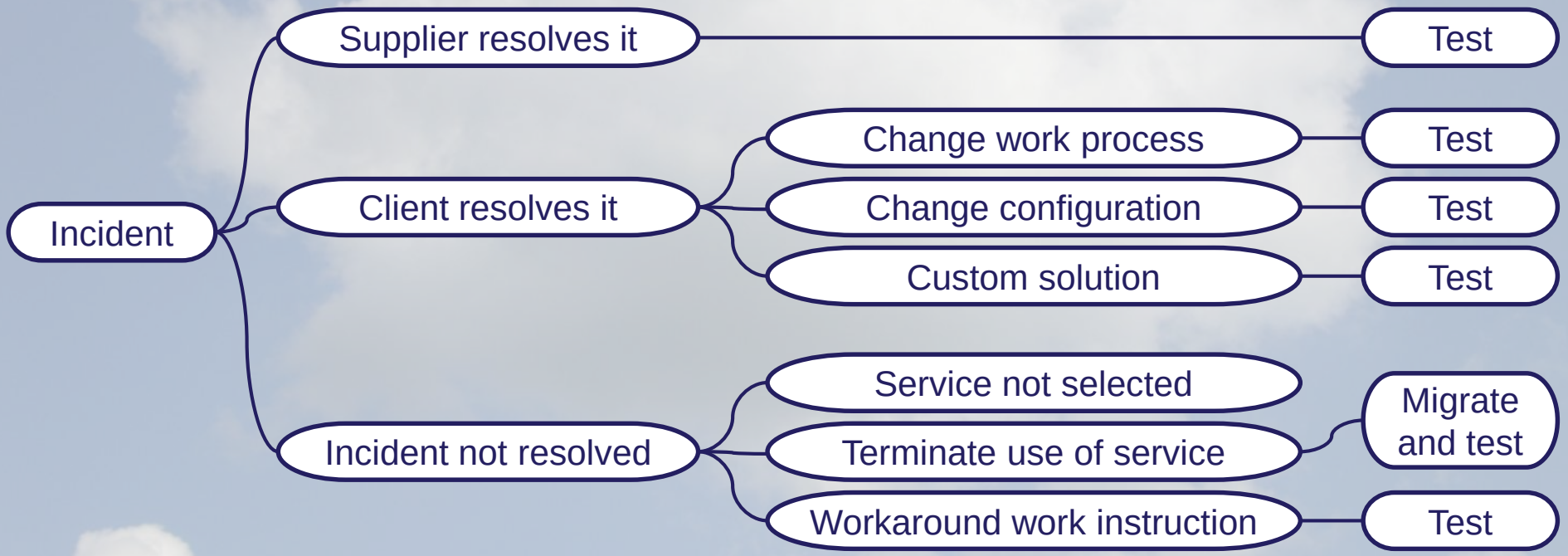
Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production

Defect Management



- Completeness and correctness of specifications and manuals
  - Supplier
  - User
- Availability of test environments
- Management of:
  - Defects
  - Changes
- Maintainability of the software

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production

- Role of system architecture
- Monitoring and Logging
- Guarantees and SLA's
- Test fail-over mechanism
- Test online/offline

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

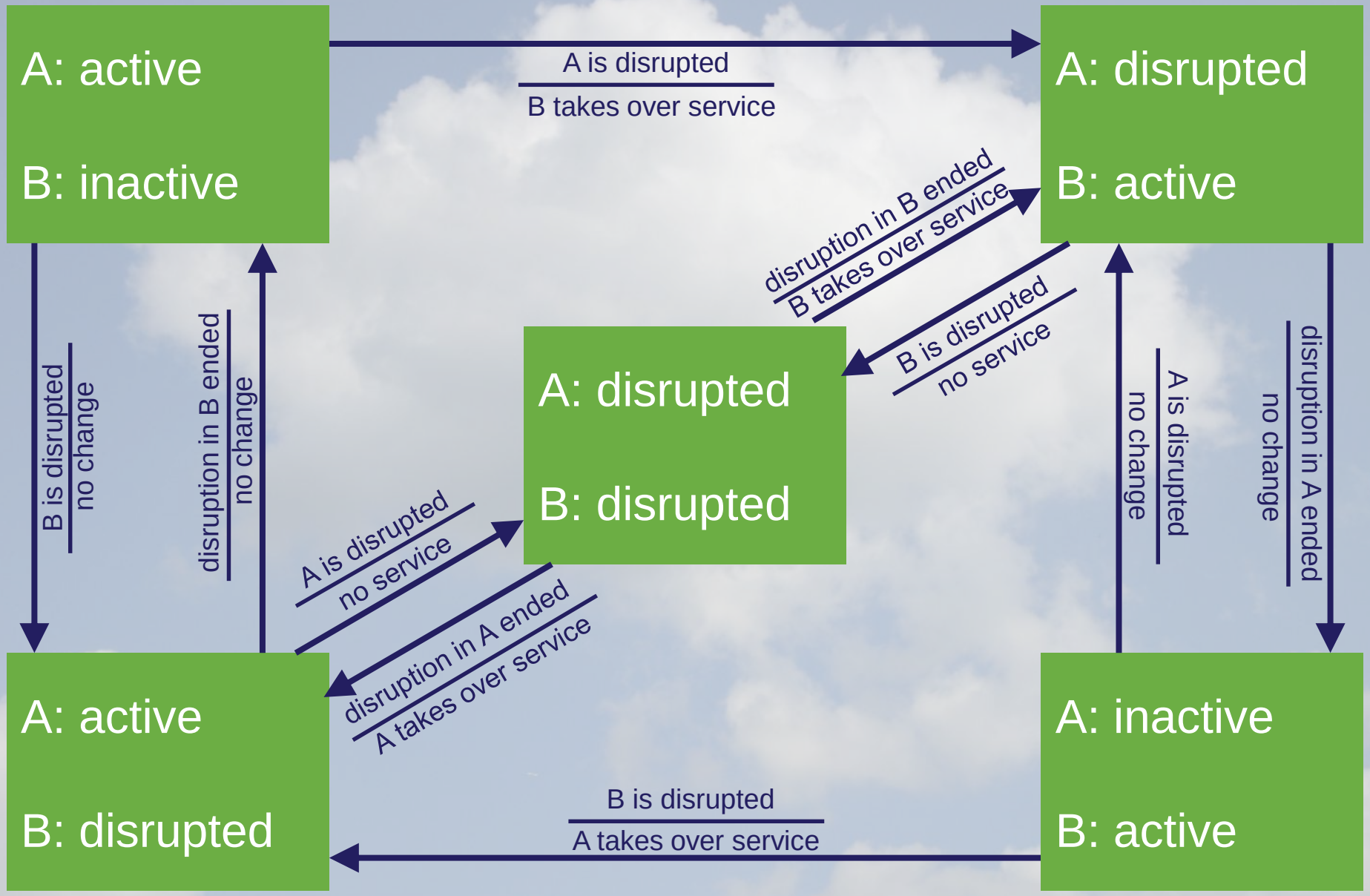
Functional Testing

Migration Testing

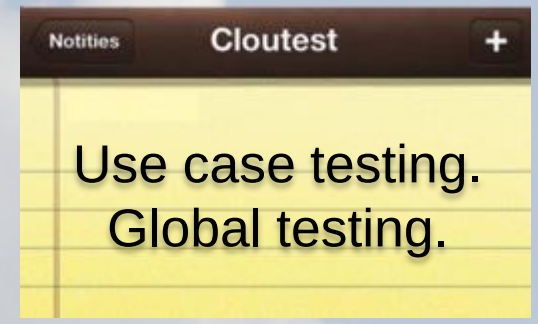
Testing due to Legislation & Regulations

Testing in Production

Fail-over testing



Online – Offline



Test Measures

- Testing during Selection
- Performance Testing
- Security Testing
- Manageability Testing
- **Availability & Continuity Testing**
- Functional Testing
- Migration Testing
- Testing due to Legislation & Regulations
- Testing in Production

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing caused by Legislation & Regulations

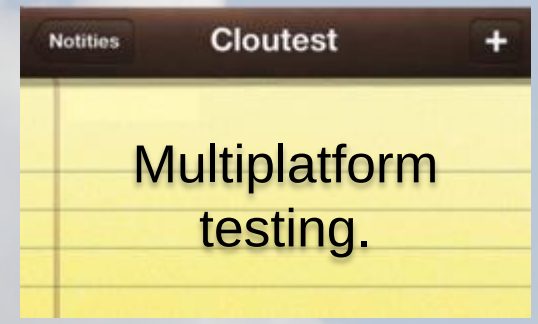
Testing in Production

How does functional testing change with services?

Functional test objectives

- Does the service fit the business processes and vv?
- Is the service quality sufficient (number of bugs)?
- Is the service sufficiently user friendly?
- Is the service configuration done correctly?
- Does supplier customization function properly?
- Does customer customization function properly?
- Do interfaces work properly?
- Are platforms properly supported?
- Does everything work after changes (is there no regression)?

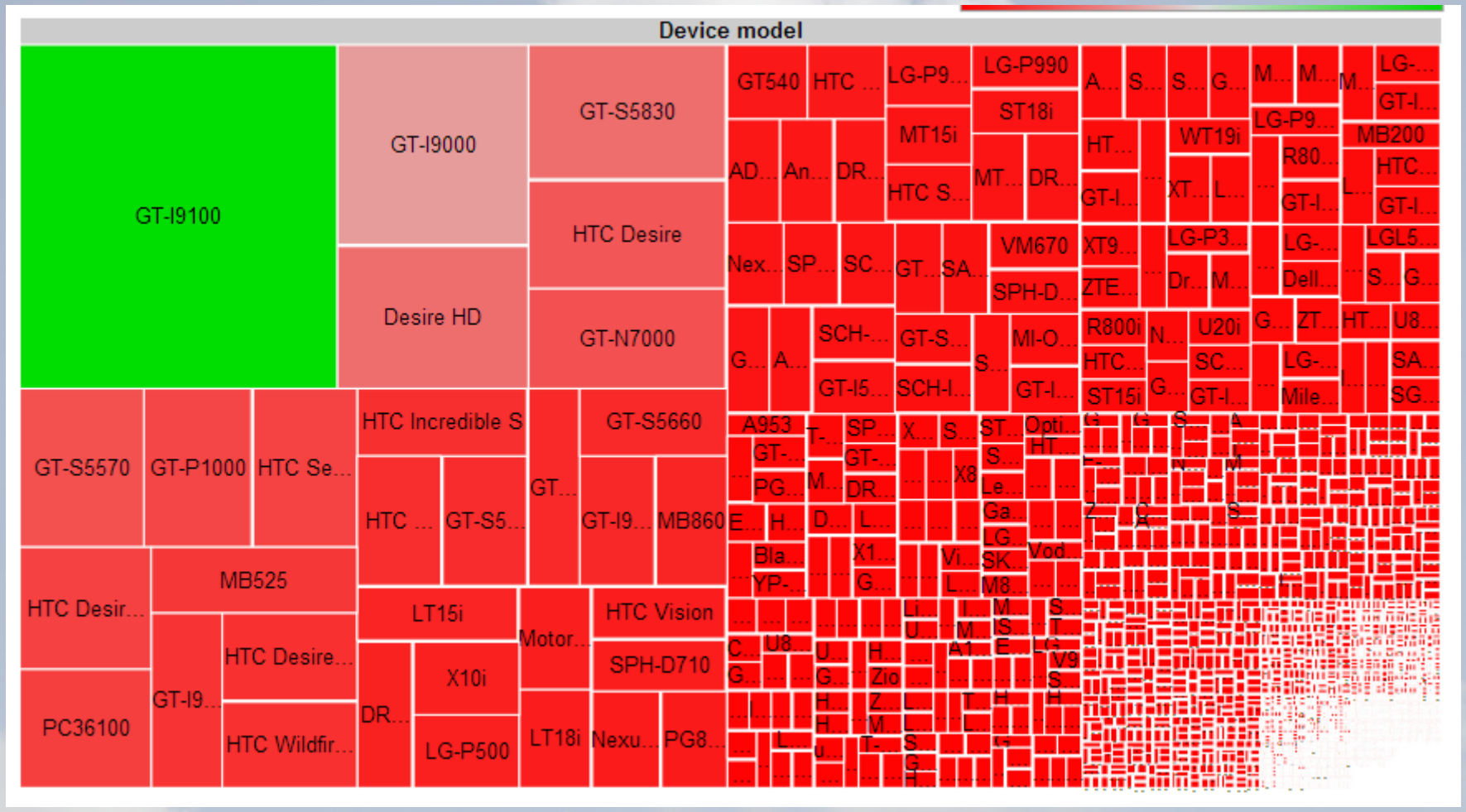
Any device – any platform



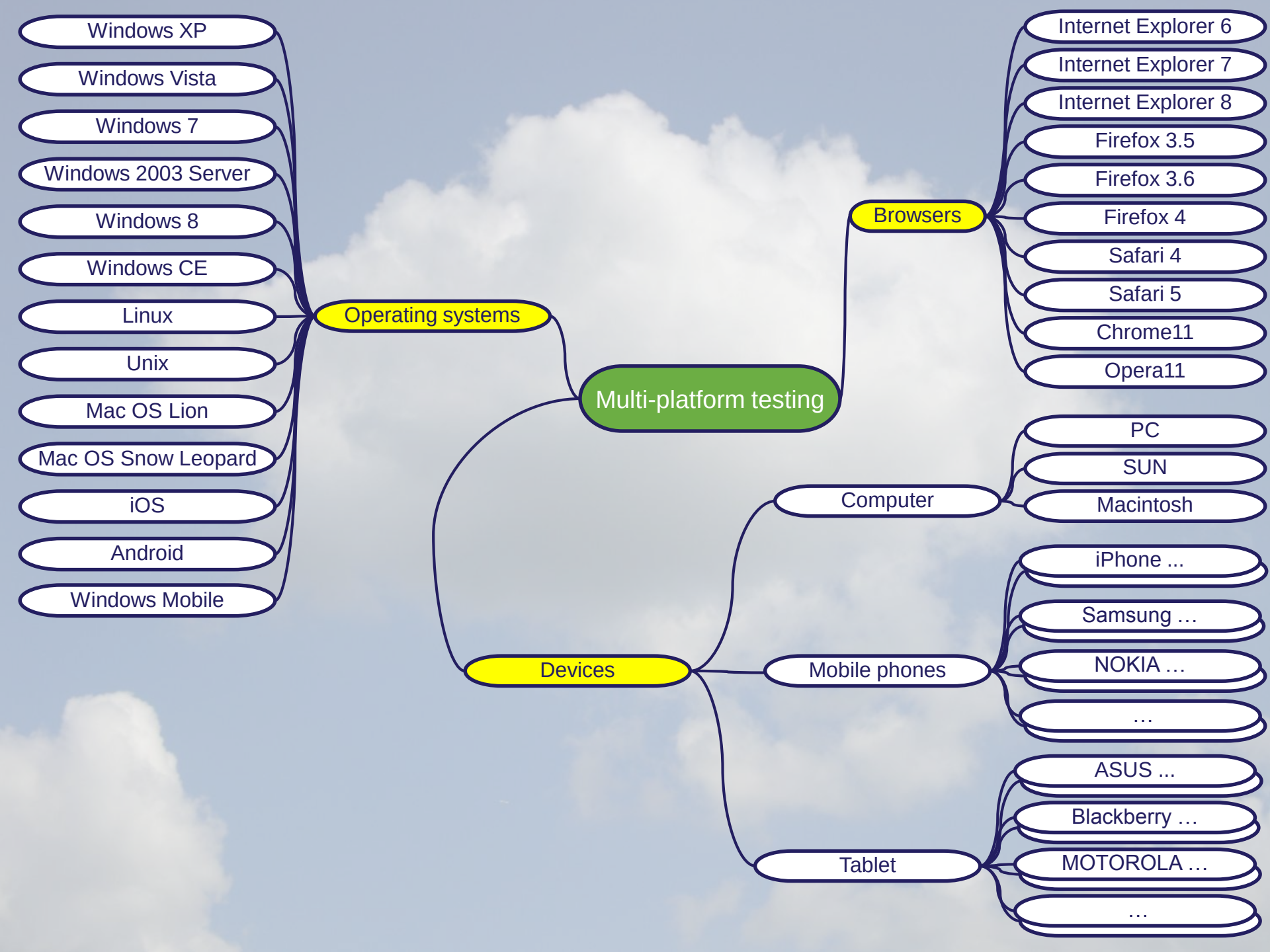
Test Measures

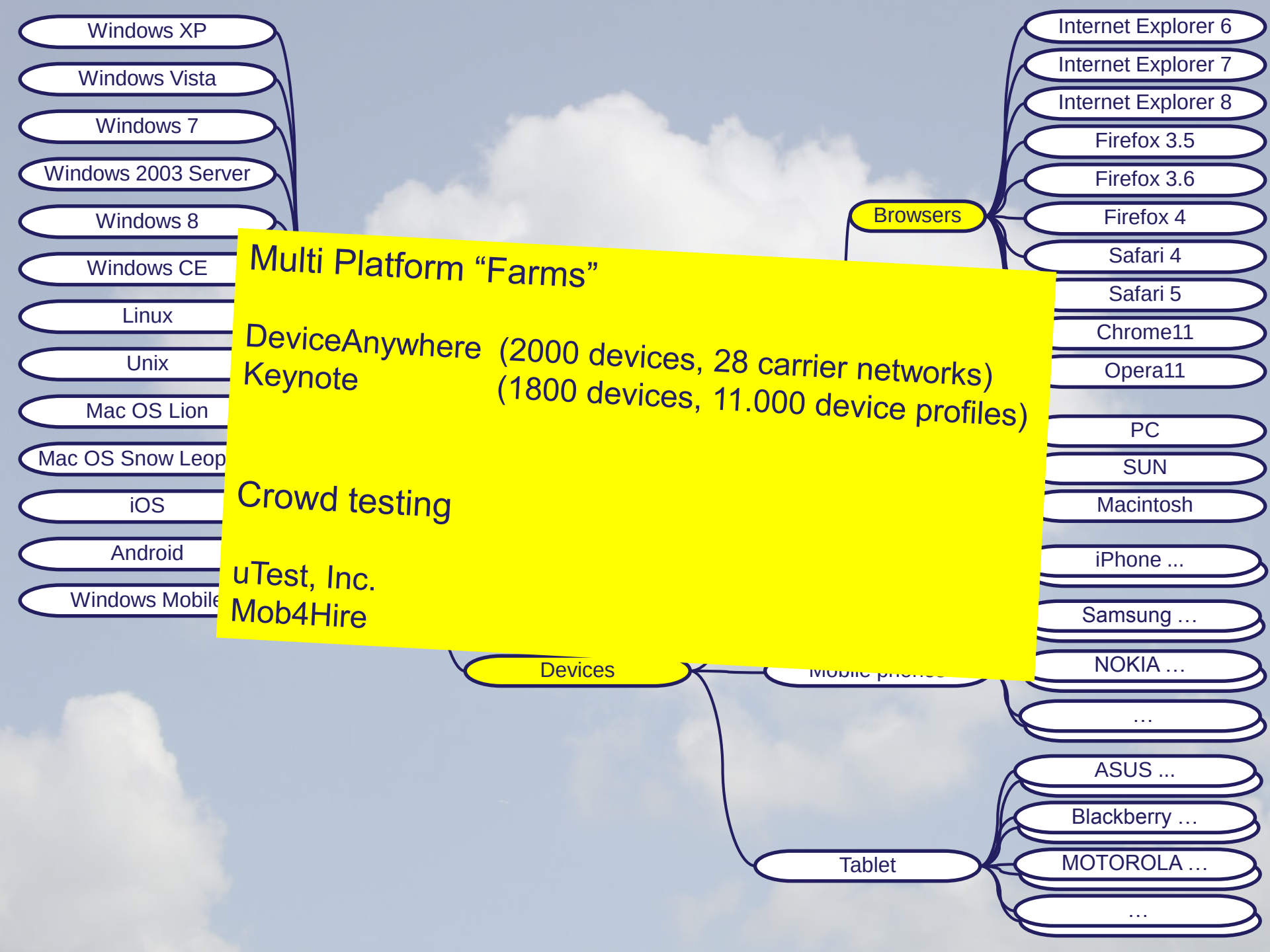
- Testing during Selection
- Performance Testing
- Security Testing
- Manageability Testing
- Availability & Continuity Testing
- **Functional Testing**
- Migration Testing
- Testing caused by Legislation & Regulations
- Testing in Production

3997 distinct Android devices

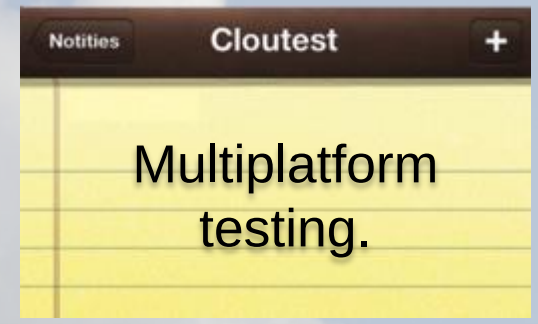


http://opensignal.com/reports/fragmentation.php


Multi-platform testing
Operating systems
Windows XP
Windows Vista
Windows 7
Windows 2003 Server
Windows 8
Windows CE
Linux
Unix
Mac OS Lion
Mac OS Snow Leopard
iOS
Android
Windows Mobile
Browsers
Internet Explorer 6
Internet Explorer 7
Internet Explorer 8
Firefox 3.5
Firefox 3.6
Firefox 4
Safari 4
Safari 5
Chrome11
Opera11
Devices
Computer
PC
SUN
Macintosh
Mobile phones
iPhone ...
Samsung …
NOKIA …
…
Tablet
ASUS ...
Blackberry …
MOTOROLA …
…


Windows XP
Windows Vista
Windows 7
Windows 2003 Server
Windows 8
Windows CE
Linux
Unix
Mac OS Lion
Mac OS Snow Leop
iOS
Android
Windows Mobile
Multi Platform “Farms”
DeviceAnywhere (2000 devices, 28 carrier networks)
Keynote (1800 devices, 11.000 device profiles)
Crowd testing
uTest, Inc.
Mob4Hire
Browsers
Internet Explorer 6
Internet Explorer 7
Internet Explorer 8
Firefox 3.5
Firefox 3.6
Firefox 4
Safari 4
Safari 5
Chrome11
Opera11
Devices
PC
SUN
Macintosh
iPhone ...
Samsung …
NOKIA …
…
Tablet
ASUS ...
Blackberry …
MOTOROLA …
…

Any device – any platform



Test Measures

- Testing during Selection
- Performance Testing
- Security Testing
- Manageability Testing
- Availability & Continuity Testing
- **Functional Testing**
- Migration Testing
- Testing caused by Legislation & Regulations
- Testing in Production

Scenarios

- Transfer into the cloud, applications remain the same
  - data moved to another location
- Transfer to SaaS
  - data migrated to new service
- Transfer from one to another SaaS
  - similar
- Transfer out of the cloud.
  - similar

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production

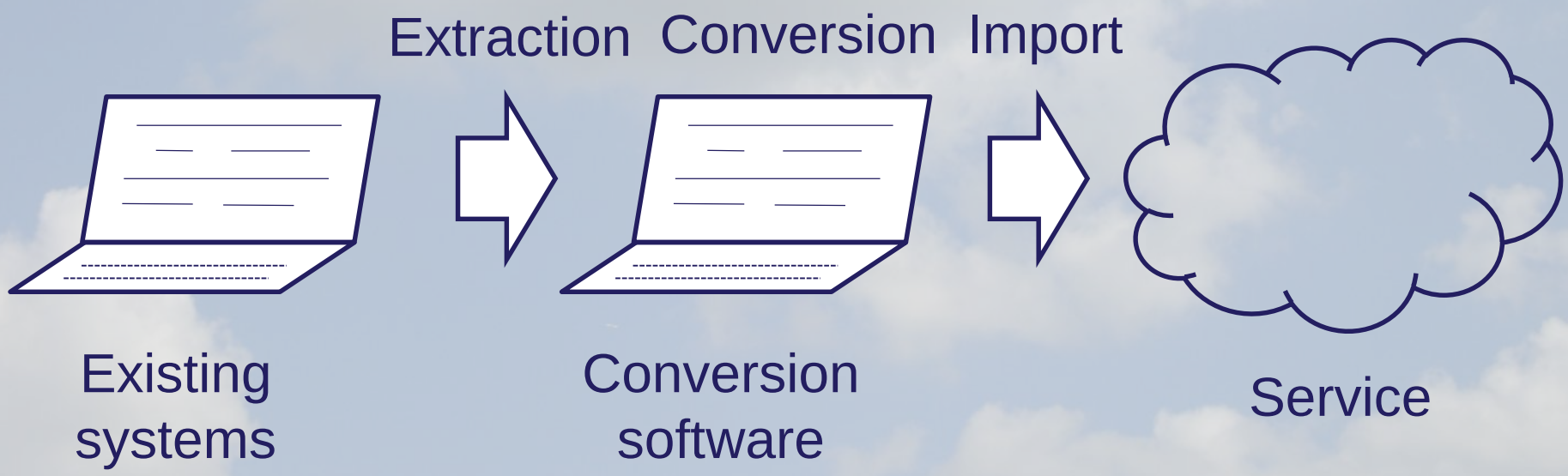
Data conversion

- Testing conversion rules
- Testing conversion on input data
- Testing if any data is lost
- Testing ongoing transactions

- Rounding (totals incorrect)
- Field lengths (truncation)
- Totals (information lost)
- Date and time conversions
  → what is 08-09-11?

- Audit trail, check sums

- E2E business scenario's



Notities Cloutest +

Incidental testing.

Sarbanes Oxley

Legislation + Regulations

=

Test basis

Notities Cloutest +

Compliancy testing.

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

Functional Testing

Migration Testing

Testing due to Legislation & Regulations

Testing in Production

Checking for legislation and regulations

- List where data that is stored in the cloud
- Find the requirements that are applicable to this data

Legal support needed for high risk

- Check supplier terms with customer's requirements

Example. A supplier of a storage service claims to be the owner of the intellectual capital of all data stored at their facilities. It is highly unlikely that this is compatible with the interests of the organization that is the actual owner of the data.

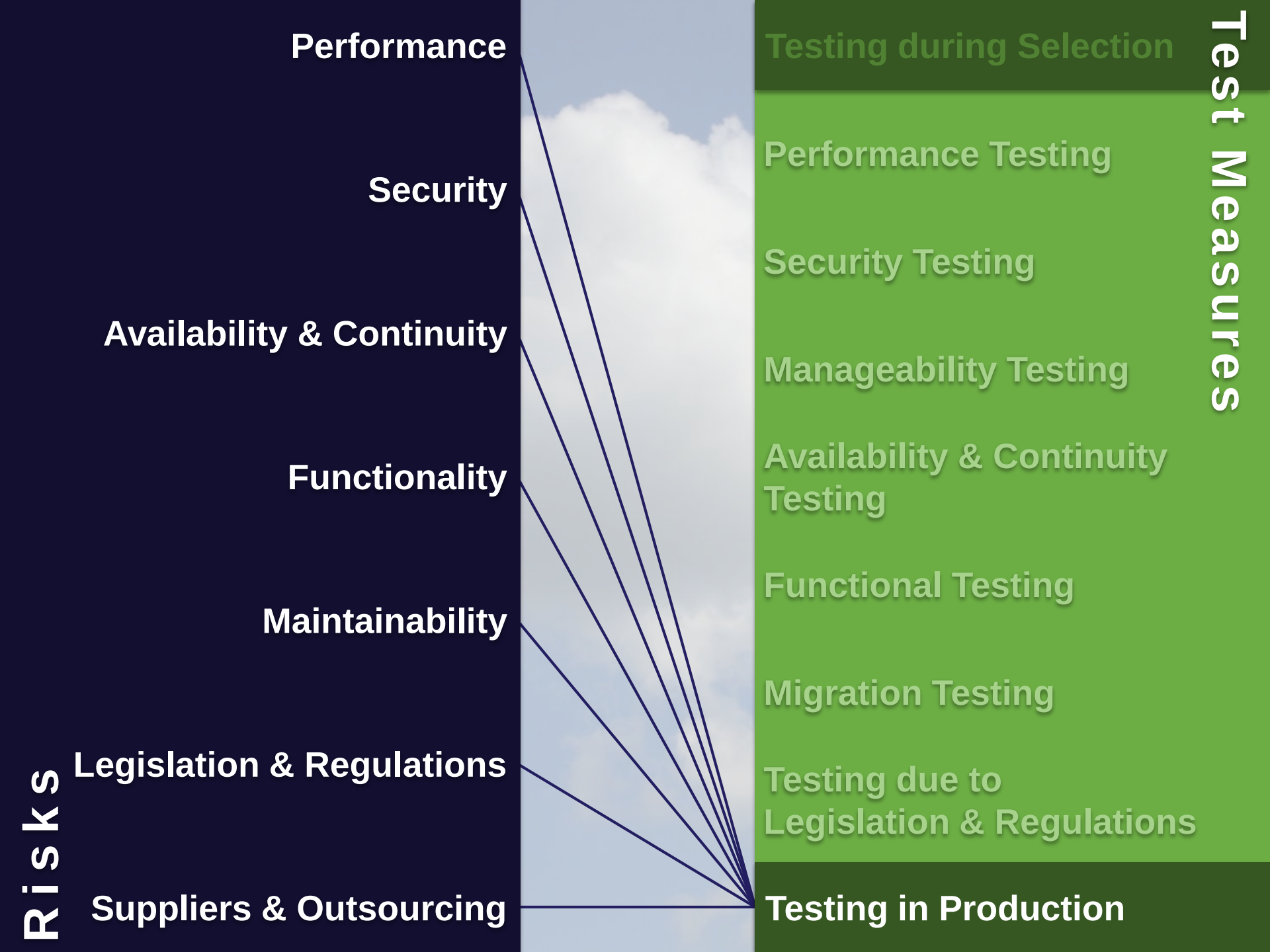
- Perform (external) audit for high risk
- Test manager provides advice, management decides

Example: Dropbox

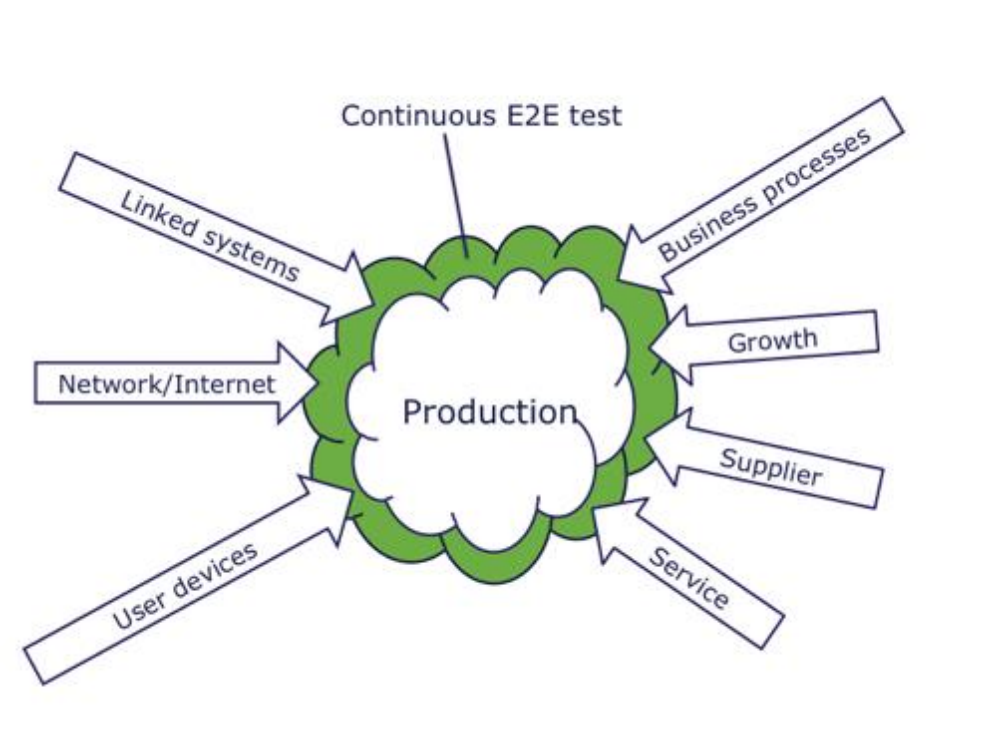
Compliance with Laws and Law Enforcement Requests; Protection of Dropbox's Rights.

- We may disclose to parties outside Dropbox files stored in your Dropbox and information about you that we collect when we have a good faith belief that disclosure is reasonably necessary to (a) comply with a law, regulation or compulsory legal request; (b) protect the safety of any person from death or serious bodily injury; (c) prevent fraud or abuse of Dropbox or its users; or (d) to protect Dropbox's property rights. If we provide your Dropbox files to a law enforcement agency as set forth above, we will remove Dropbox's encryption from the files before providing them to law enforcement. However, Dropbox will not be able to decrypt any files that you encrypted prior to storing them on Dropbox.

Is testing in production necessary?


Performance
Security
Availability & Continuity
Functionality
Maintainability
Legislation & Regulations
Suppliers & Outsourcing
Risks
Testing during Selection
Performance Testing
Security Testing
Manageability Testing
Availability & Continuity Testing
Functional Testing
Migration Testing
Testing due to Legislation & Regulations
Testing in Production
Test Measures

Continuous Change



Continuous
End-to-End Testing

Test Measures

Testing during Selection

Performance Testing

Security Testing

Manageability Testing

Availability & Continuity Testing

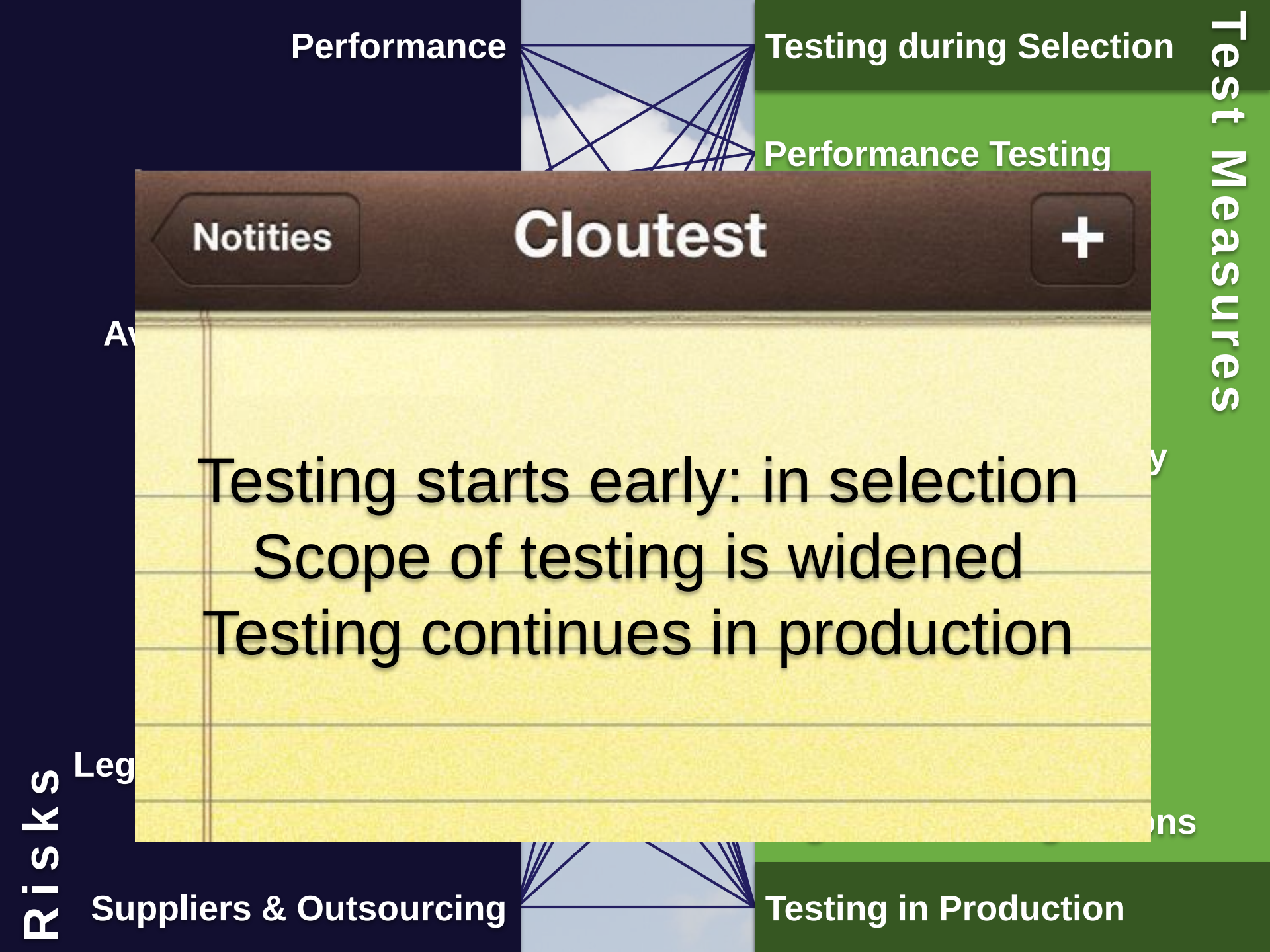
Functional Testing

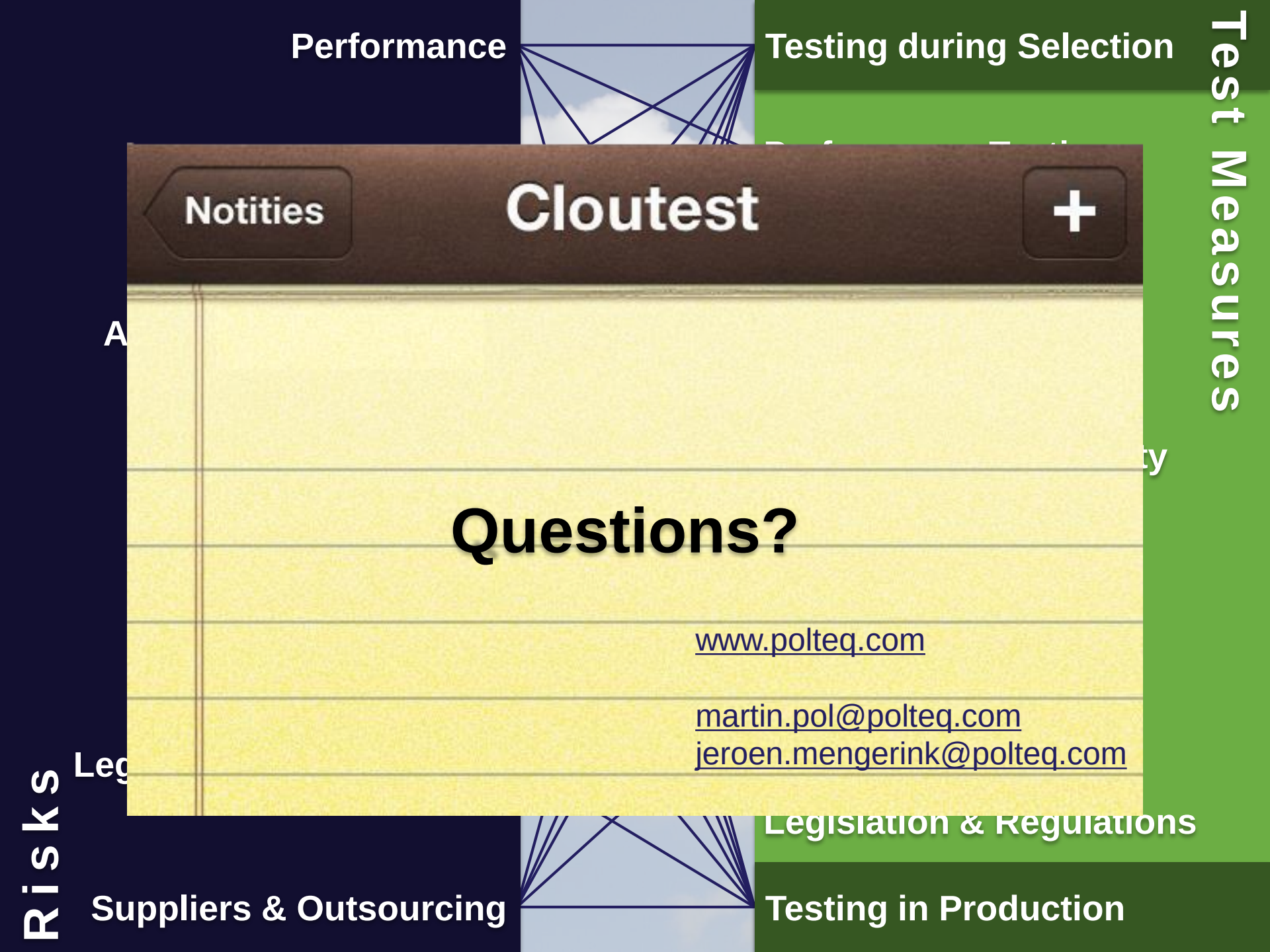
Migration Testing

Testing due to Legislation & Regulations

Testing in Production


Standards
Simulation
Audit
Testability
Check
Location
Review
Continuity
Interview
Assessment
Elasticity
Privacy
Shadow run
Inspections
Monitor
Proof of concept
Vendor lock-in
Integration
Multi platform
Validate
Test
User experience
Intake
……
Impact organisation


Performance
Testing during Selection
Test Measures
Performance Testing
Notities
Cloutest
+
Testing starts early: in selection
Scope of testing is widened
Testing continues in production
Risks
Suppliers & Outsourcing
Testing in Production


Performance
Testing during Selection
Test Measures
Notities
Cloutest
+
Questions?
www.polteq.com
martin.pol@polteq.com
jeroen.mengerink@polteq.com
Legislation & Regulations
Suppliers & Outsourcing
Testing in Production
Risks


Performance
Testing during Selection
Test Measures
Notities
Cloutest
+
Thank you!
www.polteq.com
kees.blokland@polteq.com
jeroen.mengerink@polteq.com
Legislation & Regulations
Suppliers & Outsourcing
Testing in Production
Risks